JUNE 1950

Plant Engineering

IN THIS ISSUE

Plant Lighting, Its Cost and Its Maintenance. *By R. M. Smart* 37

An Intercom System . . . ? First Analyze Your Needs 38
By William J. O'Connell

Analysis of Costs for Small Plant Coal Handling 41
By Wilbur G. Hudson

Selection, Use and Care of Tools. *By Thomas Trail* 44

Maintenance and Roofs, Walls and Floors 45
By William P. Sheehy and Thomas C. Richards

Unusual Framing Method for Heavy Piping Runs 46

Entire Pipe Bank Insulated With Blanket to Cut Costs 47

Layout and Planning of Plant Ventilating Systems 48

A Versatile Blow Torch With Safety Fuel 50

DDT For Pest Control 52

Relocating Cranes on Floor-Supported kunways. *By H. B. Clark* . . . 53

Safety Valves—Testing, Installation, Maintenance 54
By W. Elwood Rossnagel

The Rotameter and Its Use in the Plant. *By Robert K. Collier* 57

'Round About With the Editors 4

Plant Engineers' Digest 10

Try Oiling Sausage Links . . . Steam-Cleaning Oil Storage Tanks . . . Sprinklers Near Heaters . . . Can We Get Better Gas Mileage? . . . Steam Humidification for Cold Storage Rooms? . . . Selecting Vapor Degreasing Equipment . . . Titanium Grinding Needs Special Precautions . . . Skid-Proof Coating . . . Fluorescent Tube Destroyer . . . Milk Cases Are Switched Like Trains . . . Special Platform for Pipe Installation . . . Calling All Maintenance Doctors . . . Plastic Gears Give Longer Life . . . Hard-Faced Mill Hammers Give Double Service . . . Squeezing Hard Steel into Hollow Shapes

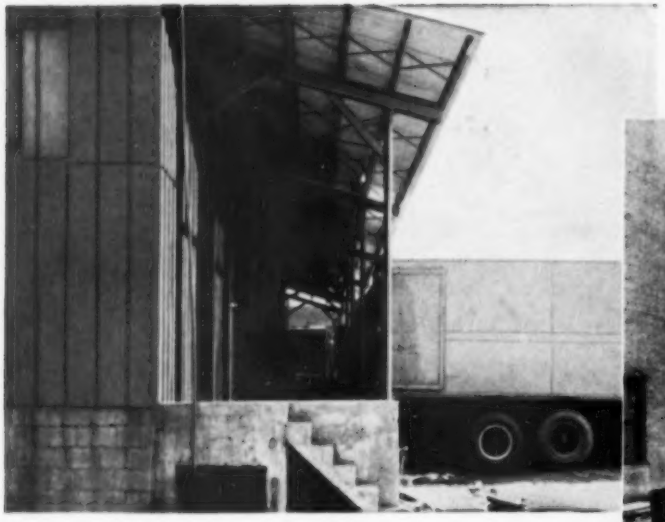
Maintenance and Operation 30

Air Pressure Keeps Work Areas Dust-Free . . . One Man Vises Help Wrap It Up . . . Growler Coil Protection . . . Hand-Cutting With the Torch Can Be Improved . . . Hopper Tip Steam Heated to Keep Coal Flowing . . . Color Used in Ion Exchange Bed

Bulletins on Current Plant Problems . . . . . 20 — New Products and Methods . . . . 74 — Data File and Library . . . . 84 — New Books for Plant Engineers . . . . . 102 — Advertisers' Index 104

Volume 4, No. 6 Circulation of this issue 29,764

The magazine that helps plant engineers with their everyday problems



LOADING DOCK (LEFT) AND CAR PORT (BELOW) UTILIZING STRAN-STEEL NAILABLE FRAMING.

WHY IT PAYS TO STOCK-PILE

STRAN-STEEL FRAMING

4 REASONS

In any industrial operation there are times when additional buildings and plant alterations of a temporary or permanent nature are required. At such times a stock pile of Stran-Steel framing members pays off handsomely.

MULTI-PURPOSE. Stran-Steel framing can be used on any enclosed building or shelter-type structure such as garage, shed, warehouse, lean-to or canopy . . . also for permanent and movable incombustible partitions.

NAILABLE. All joists, studs, rafters and purlins have patented nailing groove, permitting the application of collateral material, inside and outside, with ordinary tools and nails.

RE-USEABLE. Framing members are of light, tough, high-quality steel . . . they are incombustible and virtually indestructible . . . can be used over and over. In storage they will not shrink or lose their usefulness.

FAST ERECTION. No special skill is required . . . ordinary workmen using carpenters' tools can erect Stran-Steel framing swiftly, accurately and economically. The "in place" cost is usually less.

The Ideal Framing

Stran-Steel framing is flexible for modern design, and its use results in buildings of great rigidity. The nailable feature provides speed of erection for application of all types of wall and ceiling finishes. In stock-pile storage there is no deterioration, no shrinkage, no loss.

REGISTERED U.S. PATENT OFFICE

YOU NAIL TO STRAN STEEL FRAMING

GREAT LAKES STEEL CORPORATION

STRAN-STEEL DIVISION • ECORSE, DETROIT 29, MICH. • UNIT OF NATIONAL STEEL CORPORATION

Research keeps **B.F.Goodrich** *first in rubber*

"X-ray" of a grommet V belt— the belt that lasts 20 to 50% longer

Twin grommets found only in B. F. Goodrich V belts

YOU have to look inside a V belt to to see what gives you more belt service for your money. BFG engineers developed this "X-ray" demonstrator to show you the B. F. Goodrich grommet construction. A "belt" was made of a transparent, flexible material just so you can see the grommets.

Note the twin grommets—The two endless loops are grommets, the load-carrying section of the B. F. Goodrich grommet V belt. They're not ordinary cables, but are made by winding heavy cord on itself to make them endless.

All cords work—Placed close to the driving faces of the belt, grommets keep working close to the driving surfaces. This concentrates cord strength, all cords work, no cords overwork, the load is evenly distributed. In laboratory tests, B. F. Goodrich grommet V belts actually lasted 20 to 50% longer.

Greater flexibility—Twin grommets float in a bed of solid rubber. No plies of fabric, every part of the belt is equally flexible. Better grip, less slip. Size for size, grommet V belts give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Reduce belt failures—Most cord failures occur where cords overlap. But with an *endless* cord section in the grommet V belt, the cause of failures is eliminated.

No other V belt is a grommet V belt—The twin grommets are found only in V belts by B. F. Goodrich (U. S. Patent No. 2,233,294). It's a premium construction that costs you no more. D and E sections only.

See how the cause of most belt failures has been eliminated. Call your local BFG distributor. He has an "X-ray" demonstrator belt and will be glad to bring it around. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY **B.F.Goodrich**

PLANT ENGINEERING

EDITORIAL STAFF

RICHARD H. MORRIS, *Editor*
T. E. HANSON, *Managing Editor*
R. L. MARINELLO, *Associate Editor*
C. R. EARLE, *Associate Editor*
M. E. HENIKEN, *Equipment Editor*
EARL NOREN, *Assistant Editor*
A. W. KRAMER, *Contributing Editor*
R. E. TURNER, *Consulting Editor*

Members of

Published Monthly by
Technical Publishing Co.,
110 S. Dearborn St., Chicago 3, Ill.

KINGSLEY L. RICE, *President*
EDWIN C. PROUTY, *Exec. Vice Pres.*
WALTER PAINTER, *Vice President*
ARTHUR L. RICE, JR., *Treasurer*
CHARLES S. CLARKE, *Secretary*
RALPH E. TURNER, *Edit. Advisor*
JOHN O. AARVOLD, *Prod. Manager*

RICHARD M. WARD
Vice President in Charge of Sales

DISTRICT MANAGERS

CHICAGO: Arthur L. Rice, Jr.
John R. Morrison
110 S. Dearborn St., Chicago 3, Ill.
Phone: DEarborn 2-5446

NEW YORK: Oscar Wilde
George L. Wright, Jr.
860 Gerber Bldg., New York 17, N. Y.
Phone: Murray Hill 5-3779

PHILADELPHIA: Oscar Wilde
216 Jericho Road, Abington, Pa.
Phone: Ogontz 7261W

CLEVELAND: John R. Morrison
681 Union Commerce Bldg.
Cleveland 14, Ohio
Phone: Cherry 1377

PACIFIC COAST: McDonald-Thompson
Roy M. McDonald, Mgr.
564 Market St.
San Francisco 4, Calif.
Phone: Yukon 6-0503

Edwin T. Thompson
639 So. Wilton Place
Los Angeles 5, Calif.
Phone: Dunkirk 7-2590

Harry Abney, Mgr.
Terminal Sales Bldg.
Seattle 1, Wash.
Phone: Main 5860

SOUTHWEST: Clinton R. Julian
1414 Electric Bldg.
Fort Worth 2, Texas
Phone: 5-9122

SERVICE OFFICES:
115 S.W. 4th Ave.
Portland 4, Ore.
Phone: Atwater 7401

517 Railway Exchange Bldg.
Denver 2, Colo.
Phone: Main 2733

Subscription Information — Published Monthly. Prices: United States and Possessions one year $10.00, Canada one year $11.00. Other countries one year $12.00. Single copies $1.00.

Copyright, 1950 by Technical Publishing Co.

Acceptance under Section 34.64, P. L. & R., authorized by United States Post Office.

'Round About with the Editors

PE Society of San Francisco Meets Again

THE SECOND meeting of the recently-organized Plant Engineers' Society of San Francisco was held the evening of April 20, at the Zombie Village, Oakland. Practically the entire evening was spent in discussion of various basic rules for membership and other factors affecting growth and conduct of the Society in the future.

Three new members attended the second meeting. They were: E. B. Bridgett, Plant Engineer, California Pottery Co.; R. H. Morey, Plant Engineer, Pacific Paint & Varnish Co.; and L. Scelput, Engineer, Shell Chemical Corp. Election of officers was held and Rollin J. Lobaugh, Pacific Screw Products Co., was made chairman and E. F. Sullivan, San Francisco Naval Shipyard, was elected secretary for the next year.

Next meeting of the Society is scheduled for the Villa Chartier and it is expected that about 25 will attend; each member will bring another plant engineer as a possible member. A film on carbide tooling will be shown.

Interested in a PE Club?

FOLLOWING PUBLICATION of news of the formation of the San Francisco Plant Engineers Society in the May issue of PLANT ENGINEERING, we have received requests from several other plant engineers around the country for additional information and help in starting similar groups. If you are interested in forming one in your section write the Editor, PLANT ENGINEERING, 110 S. Dearborn St., Chicago 3, Ill.

Plant Engineering Wins Safety Award for 2nd Year

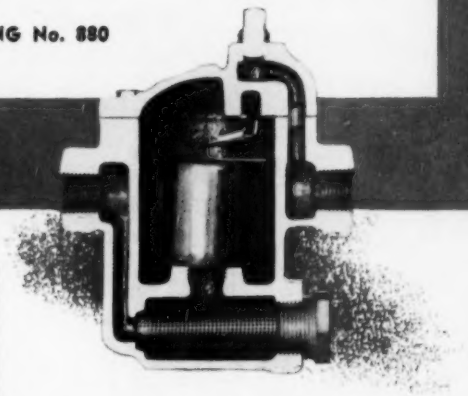
ONCE FOR the job done in 1948, and now for "exceptional service to safety" in 1949, National Safety Council has granted its public interest award to PLANT ENGINEERING and seventeen other technical and trade journals.

"Without the support of public information media, the voice of safety is only a whisper," said Ned H. Dearborn, president of the Council, in making the awards. "With their support, it is a shout that reaches every corner of the land. The public information activities just reviewed by the judges reveal a tremendous voluntary contribution to safety which undoubtedly has played a major part in bringing the accident death rate to the lowest point in history."

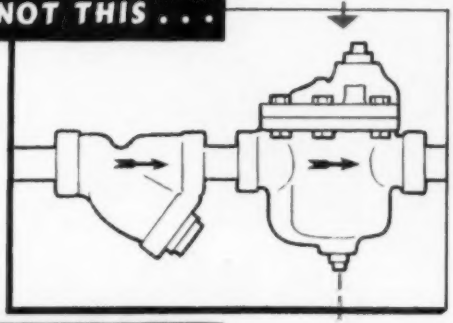
Reproduction of the award won by Plant Engineering, for the second consecutive year, "for exceptional service to safety." Award is made by National Safety Council; this year it was presented to eighteen trade and business journals

"This little Trap is
a time and money saver
. . . the strainer is built right in . . ."

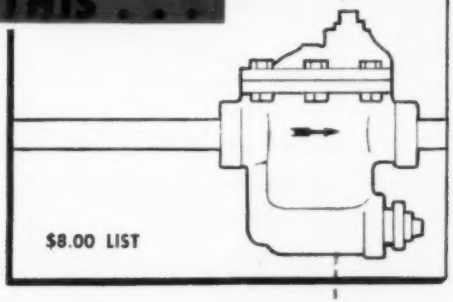
THE ARMSTRONG No. 880



NOT THIS . . .



THIS . . .



$8.00 LIST

AN ECONOMICAL steam trap for draining small equipment naturally has a small discharge orifice. When dirt or scale conditions are bad it is recommended that a strainer be installed ahead of such a trap to avoid clogging.

The Armstrong No. 880 trap is a perfect answer for such a condition. The strainer is built right into the body, thereby eliminating a separate strainer, extra fittings and considerable installation labor. Best of all, the No. 880 costs $1.00 to $1.25 less than a trap plus a separate strainer. Look over your small trap applications and order the traps you need now from your local Armstrong representative's stock.

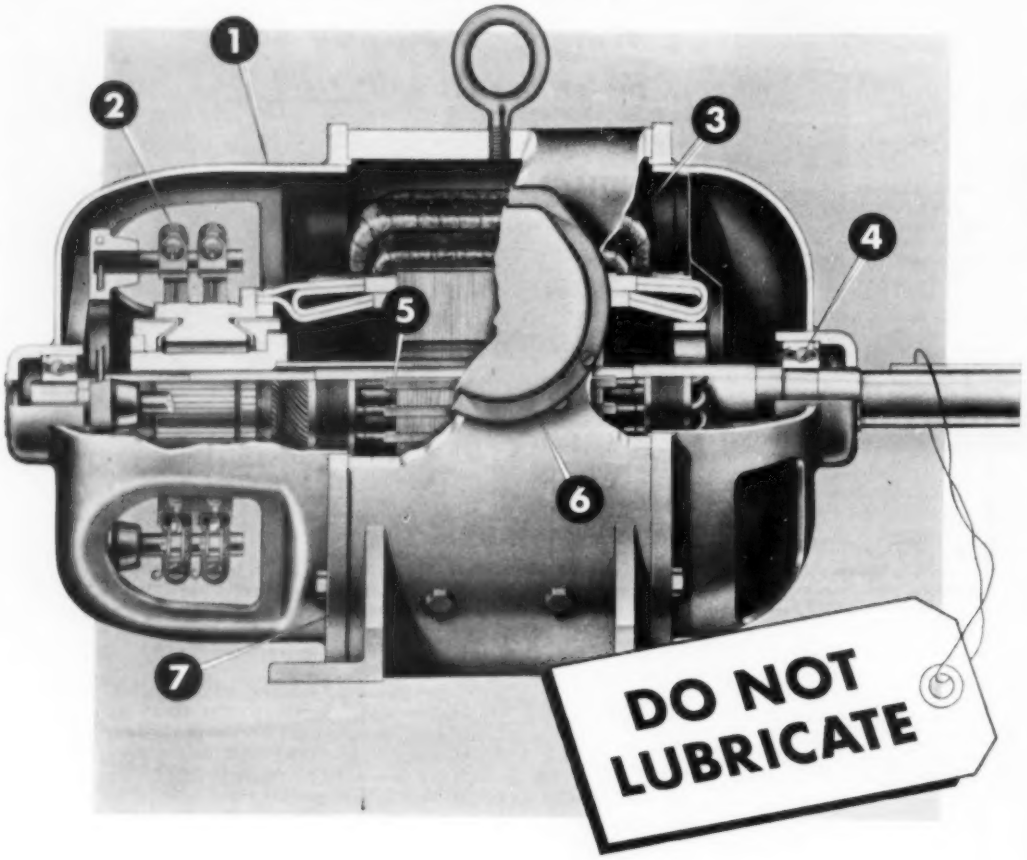
ARMSTRONG MACHINE WORKS
912 Maple St., Three Rivers, Mich.

THE No. 880 is available with ½" or ¾" connections for operating pressures to 150 psi; 450 to 690 lbs/hr continuous discharge capacity. 5⅞" high; 5" diameter; weight 5 lbs. One of a complete line of traps described in the ARMSTRONG STEAM TRAP BOOK. Send for your copy.

ARMSTRONG STEAM TRAPS

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



1. ALL-STEEL BRACKETS
2. INDIVIDUALLY REMOVED CAST BRASS BRUSHHOLDERS
3. SHELL-WOUND FIELD COILS
4. DOUBLE-SEALED PRE-LUBRICATED BALL BEARINGS
5. HEAVY-DUTY PRESHAPED ARMATURE COILS
6. STEEL-GASKETED CONDUIT BOX
7. ROLLED-STEEL FRAME

If you figure LIFE-COSTS . . . you'll figure LIFE-LINE

SK DEPENDABILITY
Wrapped in Steel
in the NEW Life-Line D-C MOTOR

Thirty-nine years at hard labor—in steel mills . . . in mines . . . in a thousand and one applications—have proved the dependability of the type SK d-c motor. Now, new dependability has been added—new motor stamina . . . new freedom from maintenance . . . new value for d-c motor users.

MAXIMUM STRENGTH AND RIGIDITY—Heavy steel end brackets and rolled-steel frame stand up to the shocking, jarring blows so often encountered in rugged d-c service.

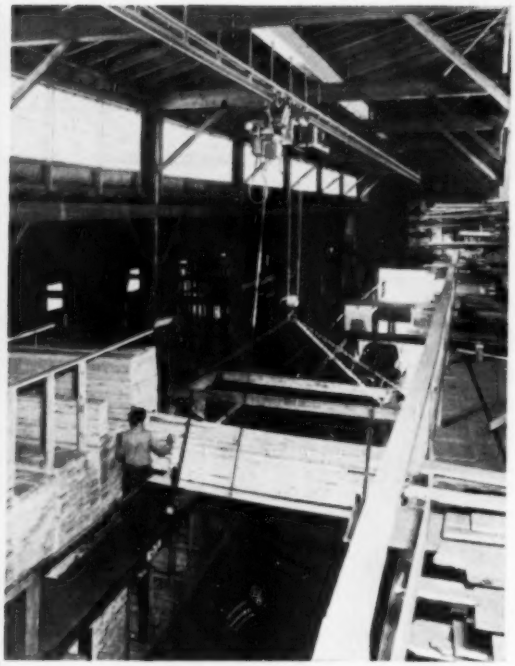
SIMPLIFIED SERVICING—Readily accessible through spacious opening in front bracket, brushholders may be removed individually. Armature coils, wound from Tufvar wire and treated in Thermoset varnish assure long life . . . reduce trouble from shorts and grounds. Double-sealed pre-lubricated bearings (proved in over half a million motors) put an end to greasing problems.

INDIVIDUAL FIELD COIL UNITS—One coil may be replaced without expense of replacing all . . . or discarding pole piece. Just slip the new coil in place . . . save repair costs.

These are a few highlights of the new, all-steel Life-Line type SK d-c motor. Get the complete facts on series, shunt, or compound motors . . . frames 203-365 . . . in 1 to 30 hp ratings. Contact your local Westinghouse representative. Ask for a copy of "D-C Motor" Booklet B-4595, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21549

Westinghouse
Life-Line
D-C Motors

Unloading pallets of random length lumber.



Pallets transferred to 3-level storage.

Lumber Storage Labor Cost

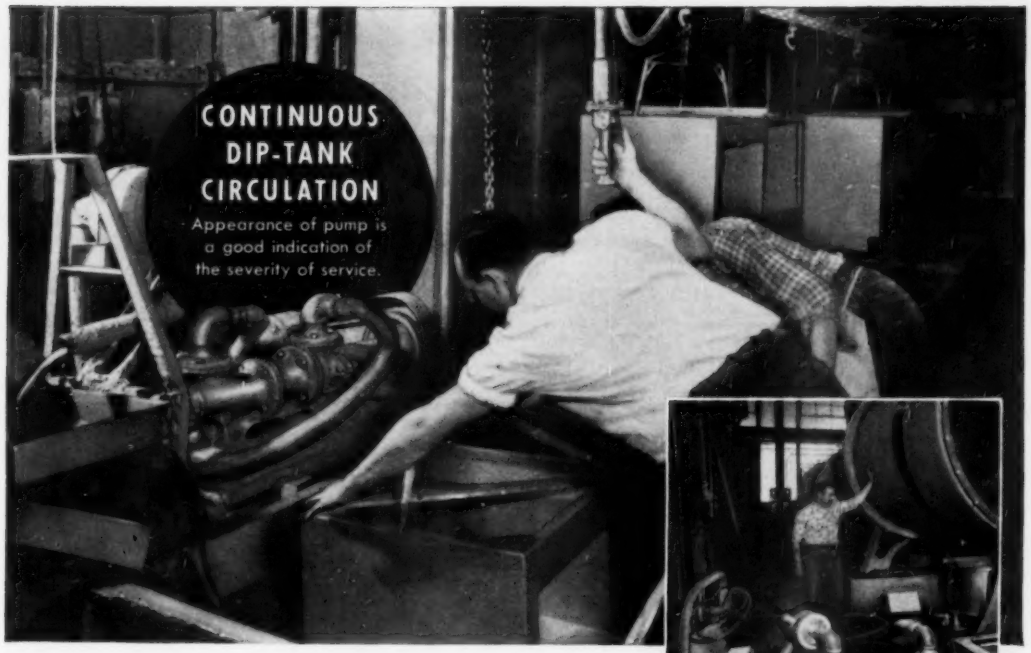
CUT IN HALF

Due to three storage levels in this lumber warehouse, normal requirements would necessitate 4 men. With the American MonoRail System only 2 men are required to handle pallets from unloading dock to storage . . . labor cost on this operation is cut in half. This is just another of the hundreds upon hundreds of cases where American MonoRail Overhead Handling Systems cut cost of materials handling. Your American Monorail engineer can show you how it will effect savings in your plant.

SEND FOR BULLETIN C-1, a 56-page book showing successful applications of American MonoRail Systems.

THE AMERICAN MONORAIL COMPANY

13132 ATHENS AVENUE CLEVELAND 7, OHIO



Hotpoint...

WORLD'S LARGEST RANGE PLANT USES WORLD'S MOST CAPABLE PUMP

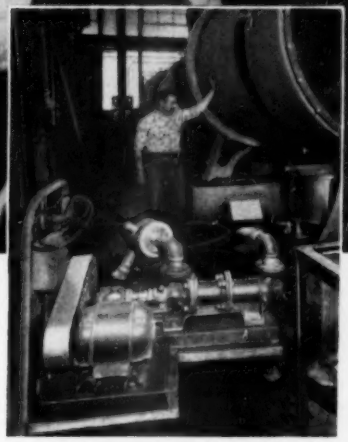
Rated capacity of 600,000 electric ranges per year! That leaves no time to *fuss* with the equipment. And *that's* why Hotpoint's big, new Chicago plant pumps enamel and ground coat with Moynos. These materials are heavy, *highly abrasive*, but the Moyno is their master. The seven pumps, in use sixteen months, have needed virtually no repairs.

NO OTHER PUMP LIKE THIS

Moynos are *famous* for "impossible" pumping—*regardless* of its nature. They have neither pistons or valves. No high-speed impellers. The patented rotor-stator pumping element develops nearly perfect suction vacuum; discharges *without* pulsation at pressures to 1000 p.s.i.

DOES EVERYTHING WELL

Self-priming, *positive* pumping action handles *highly-viscous* fluids with ease; passes particles in suspension; resists chemical reaction and abrasion. Types and sizes for all uses. Your Moyno Man can give you the whole *money-saving story*, or write today for free Book No. P-30E.

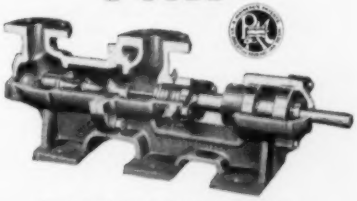


Portable Moynos pump 1.7 specific gravity enamel from eight 550-gal. ball mills to overhead tanks—a lift of 20 feet through over 50 feet of line. I. Campbell, Hotpoint's Control Foreman, observes operations

R & M

MOYNO®

PROGRESSING-CAVITY PUMP



"If It Will Push Through a Pipe You Can Pump It with a Moyno"

ROBBINS & MYERS · INC. MOYNO PUMP DIVISION
Springfield 99, Ohio • Brantford, Ontario

MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS • FOUNDED 1878

Plant Engineers' Digest

Try Oiling Sausage Links

THE OWNER of a small meat packing plant in Switzerland was having his troubles. His hydraulically controlled machine would not turn out sausages of uniform length. At the beginning of each day the links would be the correct size, but as the plant and machine heated up they would get longer and longer.

At last he called in a lubrication engineer who pointed out that as temperatures increased the oil would thin out with a resultant drop in the hydraulic pump pressure. This, plus some pump slippage, caused the operation to be sluggish, thereby cutting longer links. Univis 40 was recommended for use in the hydraulic system since it has a relatively low tendency to change viscosity with temperature changes and has an extremely low pour point.

The resultant uniformity of operation insured equal length sausages and solved the plant owner's problem. *From The Humble Way, Jan.-Feb. 1950, a publication of Humble Oil & Refining Co., Houston 1, Texas.*

Steam-Cleaning Oil Storage Tanks

ONE OF THE big storage tanks on a Humble Pipe Line Co. tank farm was down for cleaning. Already, as much oil as possible had been pumped into the slop tank for temporary storage. Later, most of it would be processed and recovered. Blind flanges, round metal plates with no opening, were bolted on to the tank's lines to seal them off and make it impossible to pump oil either in or out—an important safety consideration because of possible fire hazards.

After the tank was steamed to expel gases, the door sheets were removed for another pumping-out operation. Following this, tank cleaning specialists began playing streams of water under heavy pressure against the inner walls and floor of the tank to loosen sediment so that it, too, could be pumped out. This washing action also helped to remove gas vapors that might still be clinging to the sediment. Members of the crew were now ready to enter the tank to remove the remaining sediment, to finish the cleaning operation, and to check for needed repairs before putting the tank back into service.

All cleaning jobs have one thing in common, however. Every possible safety precaution is taken. Certain gases associated with petroleum products are poisonous if enough of them are breathed—particularly hydrogen sulfide, which is often fatal even when breathed in small amounts inside a tank where there is less oxygen than there is outside. Also, sediment which appears to be gas-free may release vapors when it is stirred up.

Even though a tank is considered to be gas-free, there may be vapors underneath the floor. To remove these, water is pumped under the tank and is then drawn out by suction. Care is taken not to weaken the foundation. Tests are made each morning during the cleaning operation, oftener if considered necessary, to make sure that no gas is present. Sediment samples are analyzed for hydrogen sulfide and other gas content before members of the cleaning crew enter a tank. Gas masks are worn when necessary while working inside.

Besides hydrogen sulfide, which is poisonous, there may be explosive gases in the tank. This makes it necessary to inspect the area around the tank carefully for such fire hazards as broken lines, open lights, matches, smoking, rivet forges, burning pits or flares. Sparks from any kind of electric equipment, even static electricity within or near the tank, may result in explosions and sudden death.

Simply stated, tank cleaning demands that all crew members know exactly what they are doing and understand fully the penalties of carelessness. *From The Humble Way, Jan-Feb 1950, a publication of Humble Oil & Refining Co., Houston 1, Texas.*

Mopping up follows the steaming, washing, and scooping out operations. Sediment not previously removed is shoveled into wheelbarrows and dumped into a pit, then pumped to slop tank. Tag indicates gas-free tank, but men wear masks

Sprinklers Near Heaters

ALERTED by a waterflow alarm, a watchman found a sprinkler head operating in an office at a textile mill. Making sure there was no fire, he quickly closed the control valve and replaced the fused head, which was of ordinary temperature rating and located near a unit heater. Later, all sprinklers near heaters were checked as to proper temperature rating.

Over eleven thousand yards of wool and rayon, as well as office furniture and equipment, were damaged by water.

When unit heaters or other heat-producing equipment are installed, be sure that near-by sprinklers are of the correct temperature rating. *From Factory Mutual Record, Feb. 1950, a publication of Factory Mutual Engineering Div. of the Associated Factory Mutual Fire Insurance Companies, Boston 10, Mass.*

Can We Get Better Gas Mileage?

CAR OWNERS sometimes ask if they can get better gasoline mileage from their cars. The answer is "Yes." The car owner could get very much better mileage than he is now getting if he would do some or all of the following things:

1. Set the ignition timing as far ahead as possible for the kind of gasoline he is using. Some drivers pay premium prices for high anti-knock gasoline, yet the timing is so late that they would get just about as good results on regular gas.

2. Have the carburetor heater adjusted for the present temperature conditions. You'd be surprised how many engines running in the summer time have winter settings.

3. Adjust the carburetor at least twice a year. Poorly adjusted carburetors, air valves, chokes and other parts account for much of the waste in present-day car operation. Leaky gaskets do not help either.

4. The regular lubrication of all parts and especially seasonable grades of lubricant in the engine, transmission, and differential should be taken care of.

5. Other smaller things which should also be considered are: Extra weight carried around uselessly counts for a lot. Many car owners keep the car trunk loaded with tire chains, bricks, pieces of heavy lumber, and junk that should have been thrown away long ago.

Then there are the tires. Most tires run too soft and consume a lot of gas and wear out sooner. The war taught us that you can get a lot more miles and a lot more life from hard tires. Keeping tires well up will save from two to five miles to the gallon.

Other minor things that may need-

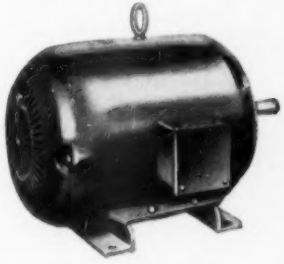
Plate glass polishing for Ford demands polished motor performance

Polishing the clear, safe-vision glass that is turned out in the Ford Motor Company glass plant at Dearborn, Michigan, is a big job. Huge lines of these 60 grinding and 100 polishing machines, which are so delicately aligned that they compensate for the curvature of the earth, are in daily 24-hour operation. This calls for polished performance . . . perfect, dependable service . . . on the part of the motors that power the tireless machines. It is significant that a battery of Wagner 40-hp type CP totally-enclosed, fan-cooled motors are used at this rigorous application.

For *your* requirements . . . there is a Wagner motor to answer every need for a standard type of electric motor in sizes from 1/125 hp to 400 hp . . . a complete line for all current specifications, with a wide variety of enclosure types and mountings.

Wagner engineers are qualified to specify the correct motor for your needs. Consult the nearest of our 31 branch offices or write us.

Continuous, unfailing power for the Ford plant grinding and polishing machines is furnished by Wagner 40-hp type CP, 445 frame, 1200 rpm. motors. There is a specific motor equally applicable to your exact need in the complete line of Wagner standard motors.



Wagner Electric Corporation
EST. 1891

MSP-18

WAGNER ELECTRIC CORPORATION
6492 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

lessly use fuel are dragging brakes and windcatchers that add to air resistance.

Yes, we can get more miles to the gallon. We can get them by simple adjustments and care. *From an article by J. Howard Pile, in The Gasoline Retailer, March 29, 1950, a publication of The Gasoline Retailer, Inc., Tenafly, N. J.*

Steam Humidification for Cold Storage Rooms?

AT FIRST the idea of steam in a cold storage room might make about as much sense as putting anti-freeze in an ice machine. The heat content of the steam would seem to offset the refrigeration effect.

Actually the temperature rise is entirely negligible. A meat storage room for example could well use steam humidification to prevent weight loss and reduction in quality due to the meat giving up large quantities of moisture to dry air.

But let's work out the facts. Supposing the humidity in this meat storage room were to be raised from 80 per cent to 90 per cent. What would happen to a 35 F room temperature if steam at 2.3 psig with a temperature of 219 F were admitted?

The temperature of the room would rise 1/7 of a degree, not worth considering. Here is what happens: Total heat in 1 lb of steam at 2.3 psig is 1153.1 Btu and total heat in 1 lb of steam at 35 F is 1074.7 Btu. The difference, or heat added to air, is 78.4 Btu.

Now saturated air at 35 F holds 2.37 grains of moisture per cubic foot. To raise the relative humidity from 80 per cent to 90 per cent requires the addition of .237 grain per cubic foot.

One pound of steam is equal to 7000 grains. 7000 divided by .237 equals 29,535 cu ft humidified by 1 lb of steam. This 29,535 multiplied by .080 equals 2,362.8 lb of air humidified. The difference of 78.4 Btu divided by 2,362.8 equals .0332 Btu for each pound of air humidified. Then, .0332 divided by .238 (specific heat of air) equals .14 F temperature rise for a 10 per cent increase in relative humidity at 35 F temperature.

On second thought, it looks like steam humidification for cold storage rooms is a pretty fair idea.

For other temperatures in the 32 F to 150 F range, a 10 per cent increase in relative humidity will produce temperature rises as shown in the table. *From an article by T. H. Rea in Armstrong Trap Magazine, No. 2, 1950, a publication of Armstrong Machine Works, Three Rivers, Mich.*

Heat gain, 10 per cent increase in relative humidity steam at various pressures

Air Temp. Deg. F	Pressure of Supply Steam 2.3 psig	5.3 psig	10.3 psig	Cubic feet of air in which 1 lb steam will produce 10 per cent humidity increase
32	.124	.1302	.136	33,000
35	.141	.147	.154	29,100
40	.167	.175	.183	24,100
50	.226	.237	.249	17,060
60	.306	.320	.340	12,080
70	.406	.426	.455	8,650
75	.465	.489	.521	7,375
80	.528	.554	.595	6,300
90	.671	.700	.761	4,667
100	.839	.890	.960	3,500
110	1.022	1.090	1.190	2,660
120	1.222	1.310	1.447	2,019
125	1.330	1.430	1.580	1,790
130	1.430	1.550	1.715	1,580
135	1.550	1.690	1.880	1,395
140	1.645	1.80	2.020	1,233
150	1.850	2.06	2.320	975

Decrease in radiation load—Supposing you want to know the temperature increase produced by steam humidification raising relative humidity from 20 per cent to 50 per cent. Room temperature 75 F. Steam pressure 10.3 psig. From the table under 10.3 psig column, the temperature rise for 10 per cent increase at 75 F would be .521—for a 30 per cent increase, 3 x .521, or 1.563 F total temperature rise.

Selecting Vapor Degreasing Equipment

IN THE SELECTION of vapor degreasing equipment, one question must be answered before all others. That question is: Which of the variations of vapor degreasing is best suited to handle the specific cleaning problem under consideration?

Essentially, there are three variations of vapor degreasing used to remove oils, fats, waxes, forming or buffing compounds, asphalt, paint, and other contaminating materials from the surfaces of parts in the process of manufacture. They are: straight vapor, liquid immersion-vapor and liquid spray-vapor degreasing. In determining the correct degreasing cycle to be used, it is important that the essential features of all three be studied as they apply to the type of work to be cleaned and the contaminant to be removed.

Straight vapor—In the straight vapor method, cleaning results from the condensation of trichlorethylene (in some cases, perchlorethylene is used) vapors directly on the work. The clean condensate dissolves the contaminant and carries it away. This method or cycle is best suited for removing an oil or grease which is soluble or largely soluble in the vapor degreasing solvent.

Heavy bars of metal may be satisfactorily degreased by simple vapor treatment, but this method is not satisfactory for small, thin sheets of metal where not enough solvent vapor is condensed for adequate cleansing action.

Immersion-vapor—If the trichlorethylene-soluble contaminant is heavy, if the parts being cleaned do not have sufficient condensing capacity to permit a good vapor cleaning job, or if the work is of intricate pattern, a more intimate contact with the cleaning medium is necessary. This contact is made possible by the use of liquid immersion-vapor cleaning, such as a boiling liquid, warm liquid, vapor rinse sequence.

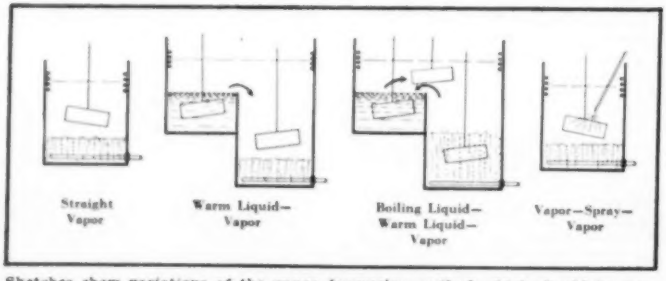
Immersion in the boiling solvent enables rapid solution and removal of the contaminant. However, the work must be "cooled" in warm liquid to permit the characteristic final vapor rinse with clean condensate.

This method is suitable for light gauge metal parts and closely nested work, but is impractical where the pieces handled are large and require an excessive volume of liquid solvent for proper treatment.

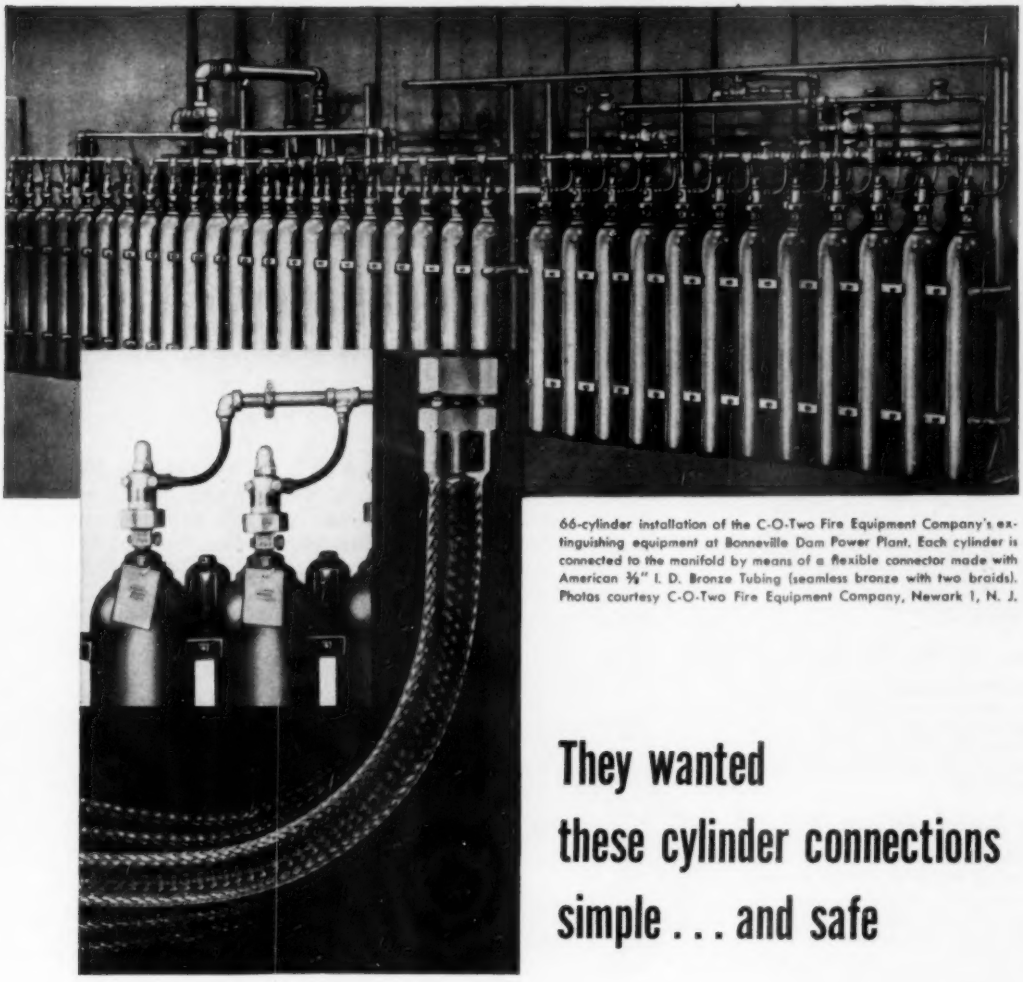
Spray-vapor—A third general type of contaminant which may be encountered is one which is only partly soluble in trichlorethylene. The most common compounds in this group are those used for buffing and heavy drawing operations.

Condensation of vapor on the work tends to remove the solvent-soluble component of the compound, leaving the insoluble constituents intact or, possibly, even baked on the surface. Immersion in boiling solvent may give acceptable cleaning results, but for consistently good cleaning, spray-vapor degreasing is recommended. The work should be sprayed as soon after the initial vapor rinse as possible in order to minimize setting or baking of insolubles on the work.

This method is not good for cleaning closely nested work, but it is very practical for handling large surface



Sketches show variations of the vapor degreasing method which should be considered for removing contaminating material from surface of manufactured parts



66-cylinder installation of the C-O-Two Fire Equipment Company's extinguishing equipment at Bonneville Dam Power Plant. Each cylinder is connected to the manifold by means of a flexible connector made with American ⅜" I. D. Bronze Tubing (seamless bronze with two braids). Photos courtesy C-O-Two Fire Equipment Company, Newark 1, N. J.

They wanted these cylinder connections simple . . . and safe

So they used American Seamless Flexible Metal Tubing for the 66 manifold connectors in this installation. Couplings swing freely and accurately into line. No struggling with rigid or semi-rigid pipe or tube.

Resists corrosion, heat and cold; minimizes vibration. American Seamless Flexible Metal Tubing can be flexed thousands of times with no danger of failure—carries thousands of pounds pressure safely. For flexible metal hose or tubing designed for use with almost any gas, vapor, liquid, or even semi-solid, consult The American Brass Company, American Metal Hose Branch, Waterbury 20, Connecticut. In Canada: The Canadian Fairbanks-Morse Company, Ltd.

C2296

ANACONDA
from mine to consumer

wherever connectors must move . . . ***American***

FLEXIBLE METAL HOSE AND TUBING

Problem: How to Handle with Safety Highly Viscous Materials Under Pressure

Chemical engineers of many of the nation's largest industrial plants have watched with interest development of the NEW BS&B T-ASSEMBLY SAFETY HEAD. It is already in demand. It is recommended for chemical plants handling viscous materials.

No other relief device acts as quickly as the BS&B SAFETY HEAD. It consists of three principal parts . . . a pre-formed metal rupture disc and two specially designed holding flanges. Correct element resistant metals are used in fabrication of the rupture disc, which bursts when a predetermined pressure is reached. Instantly a fully unrestricted escape for gases and liquids takes place. And, as quickly the possible dangers of property damage, fires and injuries to personnel vanish.

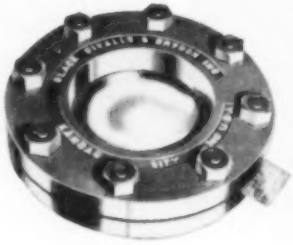
Send for This Catalog Now!

The BS&B SAFETY HEAD story is fully covered in a new catalog. Send for your free copy NOW! Use coupon on the opposite page. Once you understand your need for SAFETY HEADS, you won't delay.

Free Analysis Without Obligation

Jim Myers, SAFETY HEAD Sales Manager will have a BS&B engineer analyze your pressure relief problems and submit suggestions to you WITHOUT COST OR OBLIGATION. Mail coupon on opposite page or call GRand 6700, Kansas City, Mo. DO IT NOW!

Do You need T-ASSEMBLY SAFETY HEADS?

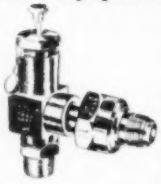


The answer is YES . . . to every chemical plant using viscous materials under pressure provided the liquid contacts the metal rupture disc. Such plants should not be without this new positive protection relief device. Read the details on "How a T-ASSEMBLY SAFETY HEAD Works" on the opposite page. This newly designed T-Assemly unit is the combined art of the highest achievement of metallurgical and engineering skill.

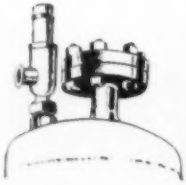
Here Are Your Answers to Relief Valve Problems--Extra Protection for Expensive Equipment

This installation is used when it is not necessary to have a shut-off or when materials handled are not toxic or inflammable.

A SAFETY HEAD at the relief outlet will stop leakage until rupture disc pressure is attained. Not recommended where viscous or corrosive materials might contaminate internal parts of the valve. Investigate your valve design before using this type of installation.

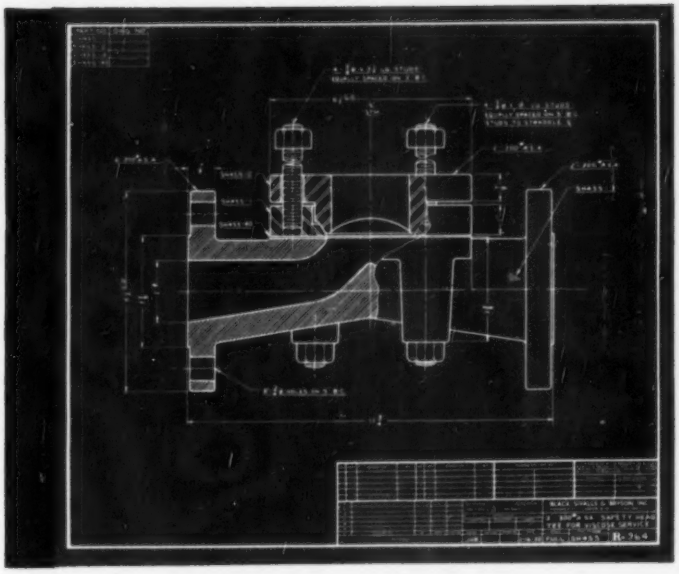


A SAFETY HEAD under your relief valve isolates the valve from the vessel contents. This stops leakage through relief valve until SAFETY HEAD disc is burst by overpressure. An open bleed line or some type of telltale indicator must be installed in chamber between rupture disc and valve plug.



When the SAFETY HEAD is used as secondary relief device you are given positive protection when pressure rises to the predetermined bursting pressure of the rupture disc. The primary relief valve may fail to function due to corrosion, or pressure continues to rise due to inadequate relief area.

Solution: .... BS&B T-ASSEMBLY SAFETY HEADS



How the T-ASSEMBLY SAFETY HEAD Works

The shaded portions of the above diagram indicate a curved channel designed by BS&B through which the viscous material washes against the rupture disc. This material moves on through the passage if no undue pressure rise occurs. However, if the passage becomes blocked, such material will tend to solidify quickly, causing a dangerous pressure rise. In that case, the SAFETY HEAD rupture disc bursts and the pressure is given a fully unrestricted opening.

BLACK, SIVALLS & BRYSON, INC.

Special Products Division

KANSAS CITY • TULSA • OKLAHOMA CITY

BLACK, SIVALLS & BRYSON, INC.
720 Delaware, Sec. 2-91-6, Kansas City, Mo.

☐ Please send me a copy of the new BS&B SAFETY HEAD catalog.

☐ Please have a BS&B SAFETY HEAD engineer analyze my relief problem, without cost or obligation to me.

Name_____

Firm_____

Title_____

Address_____

City_____ Zone____ State_____

BS&B SAFETY HEADS

work, such as metal doors, kitchen equipment parts and similar pieces.

Other equipment factors—Having chosen the proper cleaning cycle to be used, selection of the right type of machine follows from a study of work variables, such as the size and shape of the work to be cleaned, the utilities available, space and production requirements and over-all process integration. The decision as to the utility to be used to heat the degreaser will be based on availability and relative cost to the user. *From an article by V. B. Sarkissian in Modern Metal Finishing, Feb. 1950, a publication of Electrochemicals Dept., E. I. Dupont DeNemours & Co., Wilmington, Del.*

Titanium Grinding Needs Special Precautions

TITANIUM has a high affinity for oxygen, and heated particles from grinding operations frequently become incandescent. A water-base emulsion is recommended as a coolant.

Recently a large machine plant started to grind titanium for the first time, using ordinary cutting oil. While experimenting with varying depths of cuts, a hot particle ignited the oil, and fire entered a small electro-static type precipitator, where oil and metal dust burned until the unit was completely destroyed. Employees with extinguishers confined the fire at the grinder to the one machine.

Wall and monitor windows were broken, and the grinder had to be completely dismantled and rebuilt. *From Factory Mutual Record, Mar. 1950, a publication of Factory Mutual Engineering Div. of the Associated Factory Mutual Fire Insurance Companies, Boston 10, Mass.*

Skid-Proof Coating

IN MOST industrial plants there are steps, floors, walkways or trunk runways that become slippery when wet. They are not only safety hazards but maintenance problems as well. One of the Du Pont plants has made good use

This skid-proof coating is being applied to help prevent accidents caused by slipping on wet steps and floors

of a special slip-proof Neoprene coating for such surfaces.

A primer coat is first painted on. After it has dried, a heavier coating of special neoprene compound in solvent

How to spot trouble before it starts!

HOOK-ON VOLT-AMMETER

for fast electrical checks!

AF-2 LOAD VISUALIZER
5 instruments in one—measures watts, volts, amperes, vars, power factor.

You can make electrical checks in a hurry—and easily—with the G-E hook-on volt-ammeter. To measure voltage, just clip the voltage leads to convenient terminals or binding posts. There's no opening of conductors—no interruption of service.

Among its many uses, the hook-on is ideal for motor testing. In a jiffy you can learn whether motors are overloaded or perhaps under-loaded to a wasteful degree. Costly shutdowns of motors, transformers, other loads can be prevented by periodic checks.

The hook-on volt-ammeter has six ranges: 0-15/60/150/600 amps, and 0-150/600 volts a-c. Extension poles available for use on high-voltage circuits or hard-to-get-at locations. For this and other handy G-E testing instruments see your local G-E distributor or write Apparatus Department, General Electric Company, Schenectady 5, N. Y.

AP-9 A-C VOLTMETERS AND AMMETERS
For general testing—highly accurate, sturdy.

CF RECORDER
Uses no ink—inexpensive records.

Manufacturer's suggested retail price, AK-1 hook-on volt-ammeter **$74.75**

GENERAL ELECTRIC

660-171

solution is poured on, then spread to the desired thickness with a brush. Sifted sand is immediately sprinkled over the coating and partially embedded in the viscous cement. When the solvent is evaporated and the Neoprene binder is air cured, a floor covering with a non-skid surface is obtained.

Neoprene provides good resistance to heat, abrasion, sunlight, weathering, oils, acids and many chemicals. This particular coating bonds well to wood, steel or concrete and has proved to be economical, easy to apply and long-lasting. *From The Neoprene Notebook, Jan. 1950, a publication of E. I. Du Pont De Nemours & Co., Wilmington, Del.*

Fluorescent Tube Destroyer

HERE IS a safe method for disposing of used fluorescent tubes. The device shown eliminates danger from flying glass, and removes all hazards from mercury fumes and beryllium toxic effects.

The following information will help you to understand its operation: Water-pipe (A) is connected near top of insertion tube (B) and turned on while burned out lamp is being destroyed to eliminate emission of poisonous fumes from the tube opening. Hand crank (C) is merely a shaft protruding through lower end of the tube with a U-bolt welded to shaft inside tube to crush the lamp when the shaft is cranked. An ordinary oil drum (D) with a hole in the top to permit entrance of insertion tube is used as a receptacle for the crushed glass and metallic parts of the lamp. Holes punched near bottom of drum (E) drain off water containing toxic chem-

(Continued on page 22)

Here is safe device for destroying burned out fluorescent lighting tubes

Get on the Beam...

WITH A *HEVI-LIFT* TO CUT YOUR HANDLING COSTS

You're on the way to new economies when you send your loads "thru-the-air" with a P&H Hevi-Lift. Wherever speed and frequent handling are factors, P&H Hevi-Lifts save money because *one man* does the whole job quickly and safely — by merely pressing buttons. This is the way it's done these days in thousands of locations — with all kinds of loads up to 15 tons.

Why temporize? Why delay savings the Hevi-Lift is ready to bring you *now?* The first step is to let us send you the new bulletin which shows dozens of money-saving ideas.

HANDLE IT "THRU-THE-AIR" AT LOWER COST

CAPACITIES UP TO 15 TONS

P&H

ELECTRIC HOISTS
4682 West National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER
CORPORATION

HOISTS · WELDING ELECTRODES · MOTORS · P&H · EXCAVATORS · ELECTRIC CRANES · ARC WELDERS

THESE ADDED VALUES ARE STANDARD EQUIPMENT ON P&H HEVI-LIFTS

The P&H Hevi-Lift is built for years of hard service—backed by America's largest builder of overhead materials handling equipment. It costs you less to have the Hevi-Lift Added Value features than to be without them.

SAFER — True motor ratings insure against failure at full capacity loads and speeds. Thermal overload protection, 110-volt control current and crane-type limit switch provide maximum safety.

LIFETIME CONSTRUCTION — Precision-built . . . shaved gears . . . grease sealed bearings . . . moisture, dust and acid-proof.

SMOOTHER OPERATION — Motor specifically built for frequent reversals in hoist service.

MAIL THIS COUPON TODAY

HARNISCHFEGER CORPORATION, Hoist Division
4682 West National Avenue
Milwaukee 14, Wis.

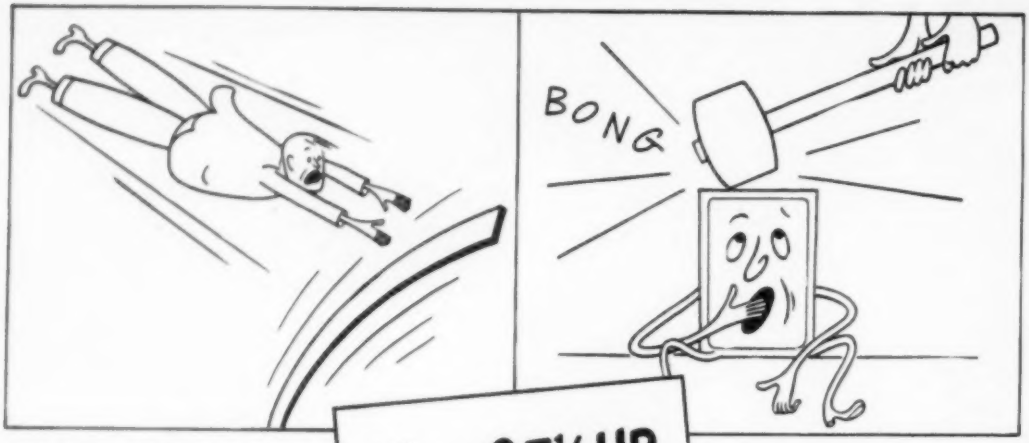
Gentlemen: Please send your new bulletin on P&H Hevi-Lift Hoists.

Name.....

Company.....

Address.....

City.....Zone.....State.....



New 2-7½ HP Manual Starters

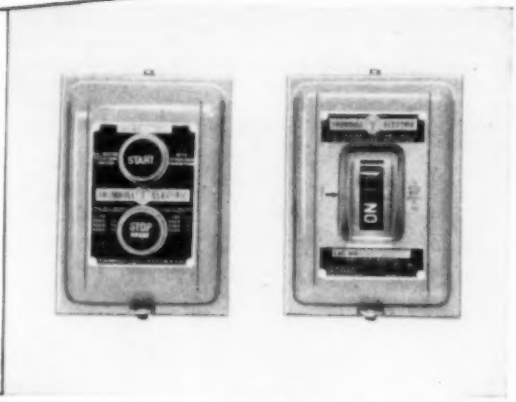
save "crossing your fingers"

Fast-Acting on Overload or Stalled Rotor Conditions

Improved thermal overload device is factory-calibrated to follow normal heating curve of motor. Handles *both* overload and stalled rotor. Trips promptly—the higher the overloads, the faster the response. Choice of 90 heater units in fractional ampere steps.

But It Won't Act When It Shouldn't

Unique latch mechanism minimizes false trip-out. A trigger mechanism gives positive, quick-acting tripping on overload—reacts only to bending of heater strip, not to vibration or knocks. And metal guard protects toggle or push-button from accidental operation.



It's Even Hard for the Operator to Do Wrong

No parts to replace after overload. Contacts cannot be held closed against overload. ON, OFF, RESET positions clearly indicated on toggle type; START and STOP on push-button types. Resetting directions clearly visible on both types. Line and load circuit numbers on barriers between contacts. Covers and toggle can be locked.

PT Means "Push-button or Toggle" ...in All Sizes

All sizes of Trumbull's PT Starter available with push-button or toggle operation in general purpose enclosures. Water-tight or explosion-proof enclosures are also available. Fine silver, butt-type contacts are easily inspected. Write for Bulletin PT. THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Conn.

TRUMBULL (T) ELECTRIC

TRUMBULL'S TRAINLOAD OF NEW PRODUCTS

Bulletins on Current Plant Problems

ELECTRICAL

101 **Care of A-C Rotating Equipment**—To promote intelligent and consistent maintenance of electrical machines, company has published Bulletin 06R7417, which is a series of articles by Fraser Jeffrey. Contents of the 24-pp booklet cover preventive maintenance and machine repairs, and include such subjects as drying moist insulation, measuring insulation resistance, bearing clearances and proper machine applications. Machine repair chapters include data on stator coil and slip ring rotor repairs and balancing of rotating equipment. Allis-Chalmers Mfg. Co.

102 **Power Circuit Transformers**—A handy ordering table is included in Folder C-15 on dry type power circuit transformers. Transformers from 30 to 15,000 va capacity are cataloged. A typical wiring diagram showing use of higher voltage circuits is included. Jefferson Electric Co.

103 **Independent Generating Sets**—Illustrated Form EKI, describes many uses for independent electric generating sets and the variety of types and sizes company has available. Folder is intended to help engineers considering an electric generating set for a specific application and in determining best type of set to suit requirements. Universal Motor Co.

104 **Control Cables**—Bulletin 3013, describes a small diameter 600-v control cable that is tough, flexible and lightweight. Illustrates its construction, showing use of polyethylene, nylon and company's Rockbide with the stranded tinned copper conductor, and includes photos of some typical applications for this cable. Sizes, specifications, advantages are listed. Rockbestos Products Corp.

105 **Magnetic Starters**—Bulletin 4130, illustrates and discusses a-c magnetic starters of the combination across-the-line type with fusible and non-fusible disconnect switches. Text covers their special features, application, construction, overload relays, auxiliary contacts, types of control, operating coils and enclosures. Dimensional data included. Ward Leonard Electric Co.

106 **Magnetic Pressure Switch**—The four major advantages of a new and compact magnetic pressure switch are emphasized in this bulletin. Explains how the switch provides protection and control for automatic operation of types of air compressors. Photos show design of switch and housing, also an installation. Ratings, dimensions included. Pro-tak-trol Corp.

107 **Electric Timing Motors**—Here's an informational catalog on electrical timing motors, presenting company's full line of standard motors, with photos, dimensional drawings, circuit diagrams and data on standard specifications and ratings of each unit. Special specifications are given for models other than standard and ordering information is included. Among motors listed is a new series designed for very slow output speeds in minimum of space. Charts giving shaft and speed data are provided. Haydon Mfg. Co., Inc.

108 **Electronic Time Switch**—Full engineering data on an electronic time switch for interval timing, time delay, repeat cycling and programming is provided in Vol. 4, No. 1 of Engineering Notes. Covers applications of switch, available methods of operation, wiring diagrams, specifications, installation and operating instructions and maintenance tips. Coral Designs Div., The Henry G. Dietz Co.

MATERIALS HANDLING

109 **Pick-Up Truck**—Bulletin 30, describing company's 1-t capacity pick-up truck with speed up to 20 mph, stresses low first cost and long run economy of the truck. Discusses major construction and operating features, includes full specifications and dimensions. Illustrated with photos. Lewis-Shepard Products Inc.

110 **Wagon Unloader**—A heavy-duty unloader for both light and continuous heavy operations is illustrated and discussed in this bulletin. Explains advantages and flexibility of its portable power unit and its non-spring roller unit. Includes prices and illustrates some of the unloader's uses. The Flinchbaugh Co.

111 **Bulk Handling**—Power trucks designed for fast, efficient bulk materials handling are described in Form 193. Filled with photos of the trucks in action—loading, digging, carrying, dumping—it describes their use with paper, brick, chemicals, glass, feed and other materials. Presents basic reasons for truck's efficient performance. The Frank G. Hough Co.

112 **Steel Belt Conveyors**—Application information and engineering data on steel belt conveyors are given in this illustrated booklet. Pictures basic model and explains how adaptations of it are engineered to fit specific plant needs. Photos show use of conveyor in various industries. Also described and illustrated are portable and elevating conveyors. A typical case history showing economy of a steel belt conveyor installation is cited. Dimensions, specifications, other technical data included. Steel-Parts Mfg. Co., Div., Blackstone Mfg. Co., Inc.

113 **Feeder-Weigher**—Bulletin 3640 is devoted to manufacturer's feeding and weighing unit for stream delivery of small, crushed, granular or non-flushing ground materials, and consisting of two belt conveyors. Discusses accuracy and applications of the unit and includes specifications, dimensional data, photos and blend diagram. Richardson Scale Co.

114 **Handling Techniques for Molding Powders**—Materials handling problems involved in the loading and unloading and storage of plastic molding powders are discussed in Bulletin 55. Illustrated with photos it covers manual handling, use of power trucks and conveyors, weighing, freight car door opening, also stacking, movement to machines, opening of drums and bags and disposal of such containers. Monsanto Chemical Co.

BOILERS, ACCESSORIES

115 **Sectional Steel Boilers**—This bulletin describes and illustrates knock-down type steel boilers for oil, gas, or stoker firing, and designed for installation without unnecessary wrecking of walls. Explains advantages and construction of the boilers. Cutaway illustration and photos show interior design, exterior appearance. Ratings, dimensional data included. Central States Steel Boiler Co.

116 **Steam Plant Equipment**—Blow-off valves for low, medium and high pressure service, water columns and gages, liquid level indicators, expansion joints, traps, strainers and other steam plant equipment for utilities, industries and institutions are described and pictured in 12-pp Bulletin G-1307. Illustrations include photos, sketches showing design details and construction. Sizes and other ordering information included. Yarnall-Waring Co.

117 **Fly Ash Collector**—This bulletin introduces a new type of low resistance collector designed for efficient fly-ash prevention on small boiler installations of limited draft. Includes photos of unit, graphs showing efficiency and draft loss, size selection table and dimensional data. Discusses operating features of collector and illustrates typical installation arrangements. Buell Engineering Co., Inc.

INSTRUMENTS AND CONTROLS

118 **Differential Pressure Transformer**—A transformer for measuring differential pressures for indicating, recording and controlling rate of flow of steam, gas or liquid fuel, water and other materials is illustrated and described in Bulletin 2230. Design of transformer is shown in a full-color cutaway illustration and text covers applications, construction features and operating characteristics. Dimensional data included. Hagan Corp.

119 **Low Pressure Regulating Valves**—Bulletin S-22-C covers company's complete line of valves for controlling gases and liquids in level, temperature or pressure requirements. It is illustrated with photos, diagrams and drawings and gives full specifications and selection data on regulating valves, valve accessories and pressure master controls. The Swartwout Co.

120 **Gas Analyzer**—An improved type of gas analyzer for measuring CO_2, O_2, and CO is described in Bulletin 120. Text ex-

Use this CARD for information on ADS and NEW PRODUCTS also

June, 1950

Card void after 6 months.

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

.....

.....

.....

.....

.....

Your Name .....

Your Title .....

Your Company Name .....

Company Address .....

City..... State.....

(If you prefer delivery at your home also fill below)

Home Address .....

City..... State.....

.....

.....

.....

Also, use this card for more information on advertised products.

plains how flue gases from boilers are analyzed to determine efficiencies of combustion, quality of fuels. Illustrations include photos of analyzer and carrying case. Bacharach Industrial Instrument Co.

121 Triple Range Tachometer—An improved tachometer with three ranges and an overall measuring scope of 50 to 30,000 rpm is illustrated by photo and described in this bulletin. Text covers design and construction of instrument, elaborating on important features and accuracy. Includes price, shipping information. Also describes and pictures several of company's other tachometers. Moulin Instrument Corp.

122 Thermometers—Catalog 15 provides complete specifications for 80 different thermometers for a wide variety of temperature measurements including such applications as cooking vat, refrigeration line, steam, hot oil, air duct, diesel engine and general testing. Completely illustrated and includes prices. U-B Instrument Co.

123 Industrial Control Devices—Catalog 6300, 84 pp. present over 100 different models of non-indicating electric, electronic, and pneumatic controllers for flow, pressure, liquid level and humidity applications. A number of important additions to previous line are shown, including electronic temperature controllers. Catalog is indexed and generously illustrated with photos and sketches and includes dimensions, specifications, necessary engineering and ordering data. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

124 Flow Indicators—Bulletin SO-4.1, 8 pp. describes company's air and gas flow rate indicators with improved design. Illustrated throughout with photos of installations, cutaway and dimensional drawings, the text covers applications of the meters, their construction and operation. Includes selection table, ordering instructions. Selas Corp. of America.

MECHANICAL POWER TRANSMISSION

125 Sheaves in Stock—Catalog 1140, 24 pp. illustrates and lists company's stock size sheaves for A and B V-belt drives, giving full dimensions, weights and prices. Covers pressed steel sheaves and cast-iron sheaves in single and combination types, sheaves with straight bore bushing and tapered bushing and fixed bore bushing. Includes tips on installation and removal of steel sheaves with split taper bushings. Rockwood Mfg. Co., Inc.

126 Speed Reducer—Complete design and application data on a compact and lightweight standardized speed reducer featuring a choice of 24 shaft locations is provided in Folder HW150. Illustrations include photo of reducer, drawings showing shaft arrangements on typical assemblies. Torque output ratings included. Winfield H. Smith Corp.

127 Cast Iron Pulleys—Bulletin 52 illustrates and provides full ordering data on manufacturer's cast iron pulleys for a wide range of industrial applications. Discusses standard construction details, specifications, gives weights and prices on various types of pulleys. Also gives prices on rubber lagging, and lists extra charges. Sprout Waldron & Co., Inc.

128 Precision Drives—Data Book 111 covers V-grooved pulleys, variable pitch pulleys, pillow blocks, round belt pulleys, shaft collars and V-step cone and crown faced pulleys. Provides dimensions, weights and ratings and includes table showing speed of pulleys based on motor speed of 1725 rpm. Central Die Casting & Mfg. Co.

PUMPS

129 Process Pumps—Bulletin 1138 describes manufacturer's new line of process pumps designed for handling hot or cold clear liquids, viscous liquids, corrosive liquids or liquids carrying suspended solids, in capacities from 15 to 800 gpm. Bulletin includes cross-section illustrations showing both open and closed impeller designs and photos of special construction features. Also provides capacity and Load range diagrams for 1750 to 3500 rpm speeds and dimension table. De Laval Steam Turbine Co.

130 Mixed Flow Pumps—Applications and details of construction of mixed flow volute-type pumps for use in sewage disposal reduction plants, raw water pumping, food industries, industrial water supply are given in Catalog F-1040. Illustrated with photos of pump assemblies and impeller, drawings showing design of both high head and low head types. Includes selection table covering most sizes. Economy Pumps, Inc.

131 Centrifugal Pumps—Bulletin W-318-B21 on two-stage double suction centrifugal pumps for pipe lines, boiler feed, general water service and other applications, illustrates their design and construction and discusses their important features. Includes dimensional data and selection chart. Worthington Pump and Machinery Corp.

BLOWERS, EXHAUSTERS

132 Power Exhausters—The special features and typical applications of company's power exhausters are presented in this illustrated bulletin along with engineering data. Includes dimensions, rating tables, material specifications, also tips on installation for minimum noise. The Gallaher Co.

133 Blower Data Sheet — Engineering layouts, design data and dimensions covering company's blowers are provided in Bulletin 58, which also gives ratings in cubic feet per minute. Unit is illustrated by photo. The Standard Stoker Co., Inc.

CONSTRUCTION MATERIALS

134 Roofing Sheet Application Data—This is a compilation of basic data on Monel roofing sheet. Covers uses, characteristics and properties, installation, cost, availability. Includes instructions on how to specify and table of theoretical weights of roofing sheet in available gages. Other tabular material presents suggested gages for use as roofing, wall flashings, leaders, cornices, other applications. The International Nickel Co., Inc.

135 Glazing Material—Folder FL-60 discusses glazing applications of Plexiglas, stressing its ease of cutting and installation and maintenance. Tells desirable thicknesses for various sizes and types of windows and lists standard sizes. Also discusses a corrugated form of this material. Rohm & Haas Co.

136 Building Louvers—Adjustable and fixed louver systems described as providing adaptability to any requirement in industrial, institutional commercial structures, are presented in Bulletin 330. Explains how it is possible to fill various size wall openings with one or more units tailored for the job. Illustrates, by photos and sketches, several styles available, and discusses construction and materials. Includes dimensions, optional operating methods for the louvers and instructions on specifying. The Swartwout Co.

137 Thermal and Acoustical Insulation—The physical properties, specifications and applications of company's Aeroflex insulation for thermal and acoustical purposes are presented in this bulletin. Generously illustrated with photos of products and uses. Owens-Corning Fiberglas Corp.

138 Concrete Inserts—Bulletin C1-2, describing an improved, lower cost concrete insert, enumerates its special advantages, pointing out that its patented features permit attachment of fittings at any point along insert face without disturbing attachments previously made. Describes a method of making your own inserts from short pieces of channel and anchor-type drive-in and caps. Complete specifications and ordering information included. Unistrut Products Co.

139 Wood Roof Trusses—The design and economy of company's intermediate span wood roof trusses are explained and illustrated in this small folder. It also lists comparative quantities required for this and other types of trusses. Timber Engineering Co.

FLOORING INSTALLATION

140 Industrial Flooring Products—This is a collection of data sheets on manufacturer's products for flooring installations and floor repairs. Includes characteristics, specifications, application suggestions and coverages. Products covered include flooring emulsions for heavy duty industrial mastic flooring, industrial asphalt mastic flooring for manual and power floated application, asphalt mastic underlayment, asphalt mastic patching for concrete floors, asphalt mastic flooring for use in severe exposure conditions, pre-mixed mastic, and non-slip coating for hazardous surfaces. Industrial Products Div., The Flintkote Co.

141 Concrete Flooring—How a heavy-duty industrial flooring is intended to meet production needs and solve special problems is explained in Bulletin 601. Stresses durability of this emery aggregate

(Continued on page 89)

Use this CARD for information on ADS and NEW PRODUCTS also

FIRST CLASS
PERMIT No. 353
Sec. 34.9, P. L. & R.
CHICAGO, ILL.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

4c POSTAGE WILL BE PAID BY—

PLANT ENGINEERING
110 South Dearborn
CHICAGO 3, ILLINOIS

...Use HOMESTEAD-REISER

FULL PORT Self-Seald LUBRICATED PLUG VALVES

. . . the Lowest Priced, Full-Port-Area Plug Valves In Their Rated Working Class

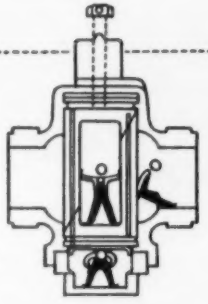
If you're using a venturi (restricted-port-area) valve with an opening of say, 60% standard pipe area, you are operating at reduced line pressure. To be sure of nearly full line pressure, you must use a larger size venturi, which of course means a higher priced valve . . . perhaps as much as 30% higher!

For example: **A 2½" Homestead-Reiser has a 100% full-port-area, or 4.78 sq. in. The 2½" size in 60% venturi pattern has only 2.87 sq. in. port area. To approximate the full-port-area of a 2½" Homestead-Reiser valve, a 3" venturi must be used. And even then you'll have less than Homestead-Reiser's full-port-area.**

In the light of this evidence doesn't it stand to reason that Homestead-Reisers with their 100% full-port-area are sound economy?

Truly, from the standpoint of both first cost and length of service, they are the lowest priced, full-port-area lubricated plug valves in their rated working class!

For complete information, write for Catalog 39, Section 5. We'll mail it to you promptly.



"SELF-SEALD" MEANS

. . . that in addition to a full-port lubricant seal the wedge-action of the plug under line pressure, forces the finished surfaces of the plug outward and constantly presses them against the seating surfaces of the body, thus keeping them always in intimate contact. The plug automatically adjusts itself for wear, assuring extra long life, maximum leakless service and lubricant economy.

HOMESTEAD VALVE MANUFACTURING CO.

"Serving Since 1892"

P.O. Box 207 **Coraopolis, Pa.**

new Snap-on* Catalog

OF INDUSTRIAL WRENCHES AND MECHANICS TOOLS

now ready for distribution

*Snap-on is the trademark of Snap-on Tools Corporation

Send for your copy TODAY!

This complete and well-illustrated catalog describes Snap-on's entire line of standard wrench equipment and mechanic-type maintenance tools. The most complete line of its kind! Write today for your copy and discover why Snap-on is servicing businesses everywhere with tools for more efficient production, maintenance, and service.

- 41 Factory Branches to assure prompt shipment!
- Facilities for production runs of special tools available!
- Widest range available from any one source!

SNAP-ON TOOLS CORPORATION
8068-F 28TH AVENUE
KENOSHA, WISCONSIN

(Continued from page 16)

ical into sewer opening (F) situated near the device.

The drum, which fits loosely beneath the insertion tube, is easily lifted out for occasional emptying of crushed glass and metal into the trash bin. The insertion tube is ordinary 3-in. steam pipe, and is bolted to the building. *From Carboloy Bits, Jan. 1950, a publication of Carboloy Co., Inc., Detroit, Mich.*

Milk Cases Are Switched Like Trains

AN EMPLOYE suggestion resulted in this change in the handling of milk cases from one conveyor line to another. Previously, the milk cases were removed from the upper conveyor and placed on the lower one.

The new idea operates on about the same principle as the switch track. The

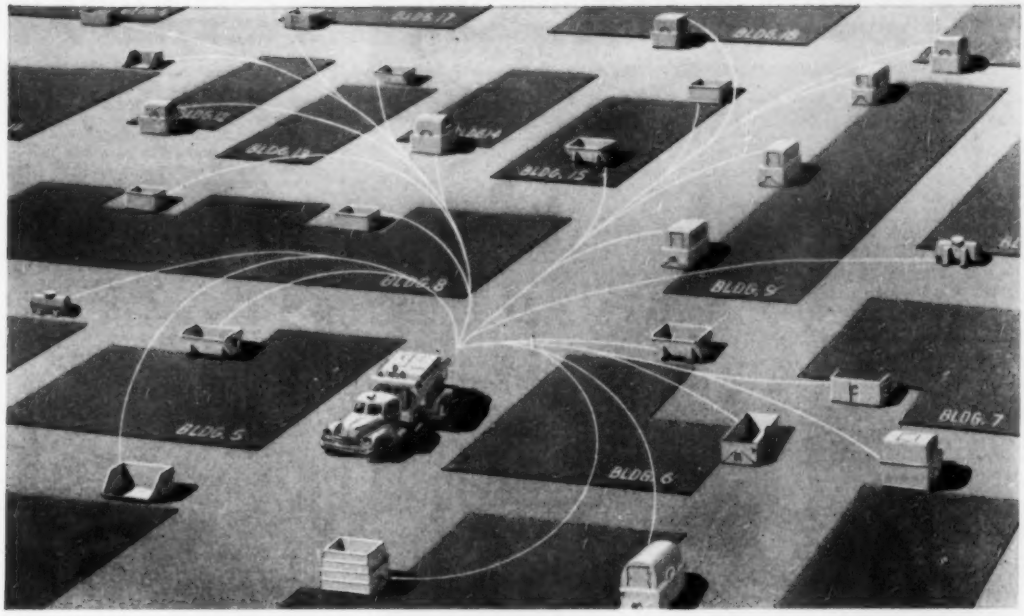
Left: Old way of handling milk cases on conveyor line is demonstrated. Cases were removed, put on lower conveyor

Right: An employe suggestion resulted in this conveyor switch, diverting milk cases from upper to lower conveyor line

removable section diverts and slides the stream of milk cases from the upper to the lower conveyor line. It has resulted in easier and faster movement of cases and has reduced the possibility of damage to product by making for smoother handling. *From Borden Circle, Feb.-Mar. 1950, a publication of The Borden Co., Chicago, Ill.*

Special Platform for Pipe Installation

HOW TO INSTALL a pressure pipe line on a bridge at Riviera Beach, Florida, presented something of a problem. Plans called for a 12 in. water line on the outside of the bridge span but under a 4 ft overhanging sidewalk. The prob-



★ Never Before Have You Been Able To Cut Bulk Materials Handling Costs So Drastically

Pictured above is a skeleton layout of a typical industrial plant using the Dempster-Dumpster System — one truck mounted Dempster-Dumpster handles the entire group of 26 Dempster-Dumpster containers of six different types. These big, detachable steel containers are like having 26 truck bodies for a single truck.

Any required number of Dempster-Dumpster containers are spotted at convenient materials accumulation points inside and outside your plant. They range in sizes up to 10 cu. yds. and are made in various designs to suit your particular needs. Materials — bulky, light, heavy, solids, rubbish and even liquids—are dumped or placed in these containers. The truck mounted Dempster-Dumpster makes scheduled rounds, picks up each preloaded container, carries it to the point of disposal, sets it down intact or dumps the materials and returns the container for refilling. The entire operation is hydraulically controlled and handled by only one man, the driver.

It is not unusual for one Dempster-Dumpster to eliminate up to 10 conventional trucks . . . reducing investment accordingly. This means cutting maintenance costs, tire and gas requirements tremendously. And, more important, it increases production with a minimum of manpower. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

Above, the Dempster-Dumpster is shown in the three simple stages of picking-up, hauling and dumping an 8 cu. yd. drop bottom container . . . completing the cycle in one to two minutes. These photos show the ease with which the Dempster-Dumpster handles all containers, regardless of their type, size or whether they are bottom or tilt dumping types.

The important feature to remember is that only one truck-mounted Dempster-Dumpster and driver handles one container after another in an endless cycle, constantly on the move for economy and efficiency never before available in bulk materials handling.

DEMPSTER BROTHERS • 160 SHEA BUILDING • KNOXVILLE 17, TENNESSEE

We shipped the three big fellows shown above to a steel plant — installed in a large building containing gas engines generating electricity. The fans provide ventilation by diluting the escaping toxic gas fumes to such a low concentration that workers' health and comfort are no longer impaired. Each of these Clarage Type W Fans handles 150,000 cubic feet of fresh air per minute at 2" static pressure — each driven by a 100 HP motor *in continuous operation.*

300 to 4000 CFM

Or perhaps you need small fans — for ventilation, for removing excess heat, smoke, odors, or more special applications. Clarage Cast Iron Exhausters can be your economical answer to such requirements. Built with cast iron housings, they offer long resistance to corrosion. Many have seen more than 25 years of service — and still going strong!

When you buy Clarage air handling and conditioning equipment, you buy the best. *We don't go in for flimsy, light weight constructions.* Clarage equipment — from our smallest sizes to the largest fans we build — is HEAVY-DUTY to save you a great many dollars in the long run.

CLARAGE FAN COMPANY - *Kalamazoo, Michigan*

CLARAGE

—HEADQUARTERS for Air Handling and Conditioning Equipment

SEE OUR CATALOG IN SWEET'S

It pays to direct fan inquiries our way . . . phone Clarage office in your city, or write us at Kalamazoo.

Application Engineering Offices in All Principal Cities

lem was how to lift the pipe out over the railing, lower it to the proper level and then move it inwardly under the overhanging sidewalk.

A suspended scaffold might damage the railing. Also it would be awkward to build, cumbersome to move and difficult to provide working space under the sidewalk close to the span.

A second possibility was the use of a barge with a built-up scaffold. But, after watching the change of tide and the current in the channel, this idea was abandoned.

The problem was finally solved by devising a platform that could be swung from a truck-mounted utility crane operating on the bridge floor.

At either end of the platform were steel uprights with hooks at the top

The platform is picked up by the crane, swung clear of the railing, lowered and moved under the sidewalk. When hooks of uprights are resting on railing, the platform is in proper position for job

to fit over the bridge railing. When the hooks rested lightly on the railing the platform was in position. Also they helped to steady the platform. However, the main weight was carried by the crane cable which was never relaxed throughout the operation.

The inward side of the platform had two steps. The upper step supported the pipe. The lower step extended under the span so men could go behind and insert hanger bolts. The weight of pipe and men was balanced on the outward side by a length of pipe secured to the far edge. *From The Power Specialist, Spring 1950, a publication of Johns-Manville, New York 16, N. Y.*

Calling All Maintenance Doctors

IT TAKES many hours to tear down large earth moving equipment to make repairs and this means a great loss of time for the repairmen, the machine operator, and the expensive piece of equipment.

Whenever a repair can be made without tearing down the machine, it means a great savings in money and time. One of the best methods of making repairs without tearing down the equipment is by flame cutting and arc welding. It's almost like an operation, you flame cut a hole to make the repairs and then you

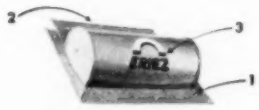
ERIEZ ATOMAGNETS HERE!

3 NEW MODELS
"EXTRAPOWER"
"ULTRAPOWER"
"SUPERPOWER"

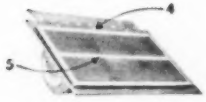
Five New Features!

1 *Riveted construction adds rigidity . . . increases structural strength.*

2 *Continuous hinge means easy and lasting installation.*



3 *Cover adds to longitudinal stiffness . . . prevents tampering and accumulation of iron on backs of castings with consequent shorting of magnetic circuit.*



4 *Insulation confines magnetic strength to working surface . . . no bleeding to surrounding areas.*

5 *Flush air gap prevents gathering of tramp iron which can short out magnetic field.*

Eriez ATOMAGNETS, bristling with super magnetic strength, are here to blast your tramp iron troubles. Nothing can compare . . . strength for strength . . . size for size . . . dollar for dollar . . . with revolutionary Alnico ATOMAGNETS.

Look at the ATOMAGNET. Sleek, rugged, stronger, lighter in weight, sporting five new features you cannot get with ordinary permanent magnets. And it COSTS NO MORE!

Ten years of magnet research . . . of invaluable practical experience . . . brings you a package of magnetic dynamite.

Three great models to choose from: "Extrapower," "Ultrapower," "Superpower." Each in a full range of sizes.

For chutes, hoppers, spouts . . . over inspection tables, moving belt lines . . . in operating or original equipment.

To learn more about ATOMAGNETS, mail coupon.

For Lightweight Applications, Ask About the Eriez Model "C" Magnet

ERIEZ MANUFACTURING COMPANY
204 State Street, Erie, Pa. Send me information on ATOMAGNETS

Name _____

Title _____

Company Name _____

Street _____

City _____ State _____ P-50

ERIEZ MANUFACTURING CO.
ERIE, PA.
PRODUCERS OF MAGNETIC EQUIPMENT

R & M CRANES GIVE WINGS to Boiler Company Steel

In the huge Huntington Boiler and Supply Company, loads of steel are constantly on the move. For fast, efficient, safe handling, these people use one 10-ton and two 5-ton Robbins & Myers electric overhead traveling cranes. From cars to storage, storage to work area, these R & M "giants" speed daily production schedules, help create a better profit picture.

CRANES, HOISTS, WINCHES FOR EVERY JOB

Powerful R & M units are available for lifting services from ¼ ton to 25 tons. Many standard crane variations: gantry, overhead I-beam cranes, plus special designs for unusual applications. Also quality hoists and winches engineered for lasting service. Choice of control, suspension and capacity.

We are always glad to analyze your requirements and quote without obligation. Write for further information and free literature.

ROBBINS & MYERS • INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS

sew or patch up the hole with arc welding.

For example: recently on a big dam project a maintenance man found or suspected large quantities of metal shavings in the gear case of the crawler on a large power shovel. The only opening into this gear case was a small grease inlet at the top. Therefore, to remove these shavings before they caused damage to the gears, it would have been necessary for two men to work a great number of hours in tearing down the crawler unit and removing the shavings.

To save this time, a 7 in. square hole was flame cut into the bottom of the gear case. Light oil was squirted in the top opening and flushed the metal shavings out the flame cut hole at the bottom.

After all the shavings were removed, 8 in. square plates were welded over the 7 in. openings with two passes of ¼ in. electrodes. *From Hobart Arc Welding News, Vol. VII, No. I, a publication of The Hobart Bros. Co., Troy, Ohio.*

Plastic Gears Give Longer Life

A TOUGH, new plastic has been developed that goes under the name of Enrup. It fulfills an urgent need for a high strength material which is resistant to abrasion and chemicals and at the same time can be produced in varying degrees of flexibility ranging between elastic soft rubber on one hand and brittle hard rubber on the other.

The biggest potential application for this plastic is in the field of high-strength, low-cost gears. Experimental gears, molded from the plastic, are now under test in several types of heavy industrial equipment. Some of these gears have been operating for as long

An employee points out the drive gear made of this new plastic. The gear has been operating in this 36 in. heavy-duty lathe for more than six months without any visible signs of wear

as one year, where conventional metal gears have failed within a few days or weeks.

In addition to greater wear, these gears also represent a cost saving to the consumer. They are molded in one piece to extremely close tolerances. This eliminates the need for elaborate finishing operations.

Among the other promising applications for the new plastic are: fuel pump

IN ALL THE WORLD... NO WRENCH LIKE

ROXCO

it's individually **REGISTERED** *completely* **GUARANTEED!**

Special MONEY-BACK TRIAL OFFER!

Buy *one* "Registered" Roxco and use it for your toughest jobs. If you don't agree it stands up better . . . is handier, faster to use . . . is a bigger value than any pipe wrench you've ever used . . . return *that one* trial Roxco direct to us (not the seller), within sixty days with a note of price paid and reason for returning. We will refund your money. This get-acquainted offer good until Dec. 31, 1950. Trimont Mfg. Co., Roxbury, Mass.

ENGINEERED BY STRESS ANALYSIS TO ASSURE HEAVY DUTY STRENGTH WITHOUT USELESS WEIGHT

See dark Hardened area

Now you need not accept useless, fatiguing weight in order to get a dependably strong wrench. Through stress analysis of every inch, the new Roxco was designed to put *extra* metal *where heavy stresses come.* And, to take out metal where it does *not* count.

The result is not only the handiest pipe wrench a man ever put to work, but also a wrench so strong that it exceeds, by a good margin, Federal Spec's for Heavy Duty Pipe Wrenches, Type II, GGG-W-651a.

So superior is this new wrench . . . so carefully quality-controlled . . . that every Roxco is individually *Registered* by number. And *every* part is *guaranteed* against breakage in any normal heavy duty use! The nine points below show why any wrench buyer and user will want the lighter, easier-to-work-with Roxco to boost efficiency . . . reduce tool costs. Order Roxco, now. Or send for folder and names of distributors.

1. Extra Strength Based on Stress Analysis: Extra metal at critical points provides higher resistance to failure. Protects work and worker. Withstands unusual stress in "side pull".

2. Lighter Weight Achieved: Stress analysis also showed where useless metal could be eliminated to produce a lighter, handier wrench.

3. Uniformity of Jaw Hardness and Strength: Both movable and Insert jaws are of drop-forged alloy steel. Teeth are hardened by automatically-timed, localized induction process at wear points, yet the tough core of jaws is retained for strength.

4. Reinforcing Shoulder Behind Insert Jaw resists any unusual stress. Assures long, trouble-free service.

5. Rapid Ratcheting Action: New, simplified cushion action replaces complicated spring. With Roxco tooth design, it prevents seizure on pipe and permits fast ratcheting action — as fast as user can move his hand. Accurate fit of assembled parts eliminates lost motion — speeds jobs.

6. Comfort-Shaped, Palm-Fitting Handle: New wide handle design is more comfortable to use — makes work easier, cuts worker fatigue.

7. Reinforced Housing embodies a hammer face to break cast fittings.

8. Handy, Accurate Pipe Scale permits quick adjustment to desired size.

Special Metallurgical Formula: Roxco Metal, combined with scientific heat treating, means superior strength in housing and handle.

TRIMO-ALLOY WRENCH . . . Roxco's only Rival . . . is an all alloy-steel heavy duty pipe wrench. Different in design, but has power comparable to Roxco.

TRIMONT MANUFACTURING CO. Division of Aetna Industrial Corporation, 55 Amory Street, Roxbury 19, Mass. Makers of Wrenches, Pipe Cutters, Vises and Other Trimo Time-Tested Tools.

Costs Keep "Going On"

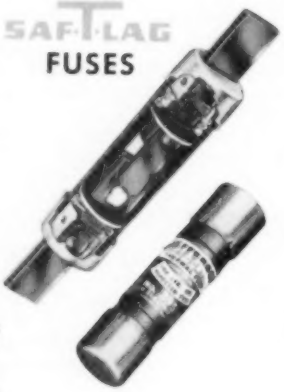
WHEN PLANT MOTORS ARE DOWN

● In industry when machines are stalled by unnecessary fuse "blows", the *costs of wages go on* but output is stopped.

To cut "stalled" time and costs, use Jefferson SAF-T-LAG Thermal Fuses. The Saf-T-Lag is not just another non-renewable fuse, but a triple duty fuse that provides new dependable protection on short-circuits, overloads — against motor burn-outs due to single phasing of polyphase motors. It has low watt loss so important where there are many motors. Thermal protection is provided for panel boards and other connected equipment against overheating caused by poor contacts or insufficient circulation of air.

Needless blows due to harmless overloads are avoided,—motors and machines are kept running to keep output up and costs of idle time down. Try them on your troublesome motors. Insist on Jefferson Saf-T-Lags.

PROTECT with SAF-T-LAG FUSES



JEFFERSON ELECTRIC COMPANY
Bellwood, Illinois

Write for Fuse Bulletin 482-ST

Jefferson Thermal SAF-T-LAG Fuses incorporate over 50 years' experience in fuse manufacture

The Jefferson Extensive Line of Fuses includes:

Saf-T-Lag Thermal Fuses • Union Renewable Fuses • Super-Lag Renewable Fuses
Union Indicating Fuses • Gem Non-Indicating Fuses • Plug Fuses and Fustats

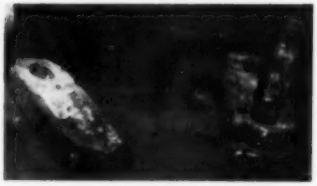
parts, battery cases, dies and jigs, valve seats, plating barrels, tote boxes, bearings, electrical insulators and various automotive parts.

This plastic has demonstrated remarkable toughness, resistance to abrasion, and resistance to the deteriorating effects of oil, solvents, acids and mild alkalis. It is light in weight, about half the weight of aluminum, and is extremely stable at high temperatures. *From US, a publication of United States Rubber Co., New York 20, N. Y.*

Hard-faced Mill Hammers Give Double Service

WORN MILL HAMMERS have resulted in loss of efficiency when used in processing abrasive raw cement in a Southern cement plant. By hard-facing these worn mill hammers the processed tonnage was recently doubled.

This was accomplished by applying Stoody Self-Hardening 21 to the worn



Mill hammer at left has been rebuilt. Right: Hammer in worn condition

surfaces of the mill hammers. As the hard metal deposit finally wears away, the hammer is again brought back to size and returned to service. The application results in substantial savings over replacement hammers. *From Fusion Facts, a publication of Stoody Co., Whittier, Calif.*

Squeezing Hard Steel into Hollow Shapes

SQUEEZING solid blocks of hard steel into many different hollow shapes—just like forming a toothpaste tube from a piece of soft lead—is a new accomplishment of indusry which may cut manufacturing costs and save large amounts of valuable metals in the event of another war.

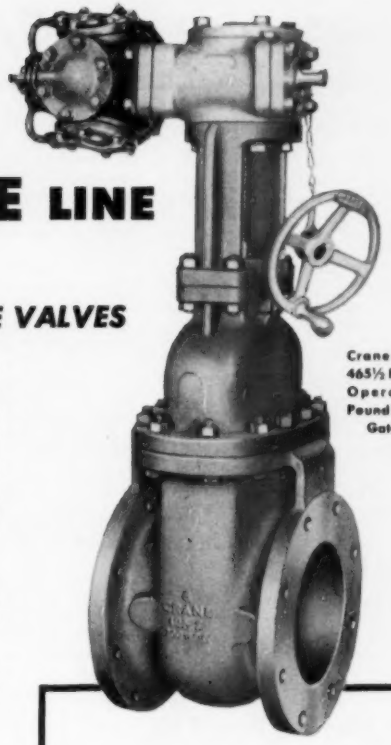
The idea of "cold forming" steel originated in Germany during the war. The process has now been carried to the point where we have now outdistanced German researchers in its application in production to all kinds of products.

The new process is said to improve the quality of the finished product, frequently eliminating need for expensive alloy steels and critical brass and bronze. It replaces forging and casting and reduces machining operations required. Enormous savings in scrap are also possible.

Secret of the process is discovery of a method of lubricating the steel during the cold forming process. Some steels could be reduced to less than one-sixth their original cross-sectional area while pushing them through dies. They also became almost three times stronger in the process and the finish is better than by machining. *From a news release of American Society of Tool Engineers, crediting talk of J. P. Bowden, Heintz Mfg. Co.*

ANSWER TO A SPECIFIC NEED NOW IN THE CRANE LINE

NEW, LOW-COST FLUID-MOTOR OPERATED GATE VALVES



Crane 8-inch No. 465½ Fluid-Motor Operated 125-Pound Iron Body Gate Valve.

These valves fill the need for a power-actuated pipe line control at lower than usual cost. By utilizing a simplified fluid motor, they permit wider application of mechanically-operated valves to increase plant efficiency.

Low in first cost . . . low in operating cost . . . Crane Fluid-Motor Operated Valves save labor, help prevent accidents and offer definite advantages when installed on hard-to-reach valves or on valves used in timed operating cycles.

OPERATE AT LOW COST—Crane Fluid-Motor Operated Gates utilize pressure sources readily available in most plants—compressed air, water, or oil . . . at pressures ranging from 40 to 300 psi.

HIGH STARTING TORQUE—Motor is reversing type and is designed to exert greater torque when unseating the valve than when seating it. Added power to open valve against sticking is assured.

NO WASTE OF POWER . . . NO LOSS OF FLUID—Pressure-tight motor stalls when disc is in fully open or closed position. Motor can remain stalled indefinitely . . . under full pressure . . . with no leakage of operating fluid. No power is wasted in maintaining fluid at proper operating pressure.

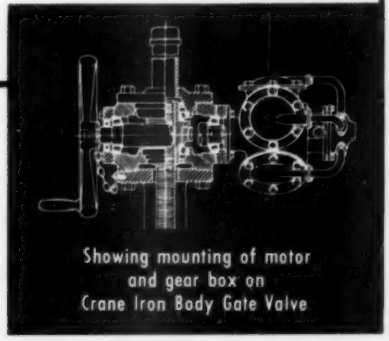
Crane Fluid-Motor Operated Valves are now available in the following pressure classes, types and sizes:

25-pound wedge disc gate	**12-in. to 30-in.**
125-pound wedge disc gate	**5-in. to 20-in.**
25-pound double disc gate	**10-in. to 30-in.**
100-pound W.O.G. double disc gate	**6-in. to 24-in.**
A.W.W.A. double disc gate	**4-in. to 20-in.**
Pulp Stock Valves	**8-in. to 20-in.**

How Crane Fluid-Motor Works

Radial-type motor has five diaphragm sealed chambers. Operating fluid, admitted through a 4-way distributing valve, acts against diaphragms to exert force against pistons. The pistons, in turn, transmit the thrust to an eccentric which causes drive shaft to rotate. Hammerblow device in gearbox allows motor to attain speed before loading and provides impact to overcome friction of valve parts.

Send for this descriptive folder—See how Crane Fluid-Motor Operated Gate Valves can help increase the operating efficiency of *your* plant. Ask your Crane Representative for your copy, or WRITE FOR FOLDER AD-1803. No obligation.



Showing mounting of motor and gear box on Crane Iron Body Gate Valve

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

Maintenance and Operation

Air Pressure Keeps Work Areas Dust-Free

BOEING Airplane Co., which long has pioneered in development of pressurized aircraft, has brought pressurization into its own factory.

By slightly pressurizing several specialized work areas and feeding a constant supply of dust-free and temperature-constant air into them, Boeing has found that an exactness of tolerances can be kept in some of its work which could not be attained by specialized skills and tools alone.

Never is the lowly dust mop needed. Despite constant opening of doors, dust never creeps in because pressure is always greater in the rooms and the flow of air is always from them into adjoining factory areas.

In one experimental shop, in which turbines are assembled to run as high as 36,000 rpm, difficulty was encountered in keeping vital bearings dust-free during installation. Several times is was found necessary to disassemble an entire turbine mechanism merely to clean the bearings. Subsequent conditioning of the room by Boeing engineers not only removed this annoyance, but eliminated errors in a nearby magnetic machine which had resulted from the presence in the air of fine metal particles.

Workmanship is not the only thing which benefits from the air processing system. Workers themselves are less likely to pick up germs because they are working in an atmosphere more sterile than exists in most hospitals. Airborne spores are entirely removed and a large portion of airborne bacteria is similarly purged.

Although air is not processed in the same manner for each of these working areas, in most cases, it is passed through two filtering stages and through thermostatically controlled heating or cooling units before being blown into the rooms.

In the first filtration process, air is drawn directly from out-of-doors and through a mechanical filter consisting of coarse steel wool dipped in oil. This filter's efficiency enables it to remove 96 per cent (by weight) of the dust going through it. It is effective on all dust particles down to five microns in size, or, one thousandth of an inch.

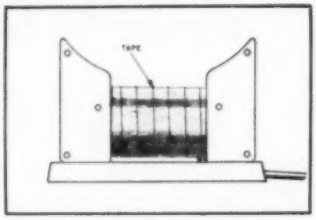
Next, the air is regulated by thermostatic controls and either is passed over steam coils or is routed through a refrigeration system maintained exclusively for the one room. Temperature in the room thus is maintained constant to within four degrees at all times. The final filtration process is electronic.

One Man Vises Help Wrap It Up

Photo: The Columbian Vise & Mfg. Co.

A handling problem at Allied Steel Products Co., Cleveland, found a successful solution through the use of three hydraulic vises. The problem consisted of binding together five steel bars, 10 ft long, using just one man for the operation. Stepped-up production was achieved by the use of three hydraulic vises operated at one point by one man employing a two-pedal foot control which left both of the operator's hands free to position the five pieces of steel accurately

Growler Coil Protection



Covering the coil of a growler with sheet fibre, held in place with tape, will help protect the winding from damage

Hand-Cutting With the Torch Can Be Improved

Contributed by Linde Air Products

A LITTLE EXTRA care in positioning the nozzle in the blowpipe head will give cleaner, neater looking cuts with less slag adhering to the cut edges. The secret lies in setting the nozzle so pre-heat flames strike the metal in proper relation to the line of cut.

To cut a square edge at right angles to the surface of the steel, set the nozzle as shown in the upper part of the sketch. Before tightening the nozzle-retaining nut be sure the nozzle is positioned properly in the blowpipe head. When the cut is started two preheating flames should fall directly along the line of cut—one preceding the oxygen, the other following it.

When making a bevel cut, rotate the nozzle 45 deg from the position recommended for a square cut. Then tighten the nozzle nut to lock it in place. In cutting the bevel, preheat flames should fall to both sides of, but not directly on, the line of cut. When preheating flames are inclined at an angle to the surface of the steel the most efficient distribution of heat is derived.

The blowpipe gives best results when the nozzle is held at the proper distance from the surface of the work. In making a square cut the ends of the inner cones of the preheating flames should just touch the surface. For a bevel cut move the nozzle away a little. Pre-heat flames may be held $\frac{3}{8}$ in. or more above the surface depending on the thickness of the metal to be cut.

Making a bevel involves cutting

$125 and 7 weeks saved, thanks to NI-ROD repair of cast iron speed reducer

When a mishap all but destroyed a vital coil-vat speed reducer, maintenance men of the M & R Dietetic Laboratories were faced with a serious problem.

A new speed reducer cost 135 dollars and would take 8 weeks to be delivered. Repairing the unit would require only a week, but the damage was so extensive that success seemed doubtful. Yet, there was so much to be gained that they decided to take the gamble.

The shattered speed reducer was sent to M & R's welding shop, where . . . using Ni-Rod® electrodes . . . their welding technicians succeeded in assembling the broken pieces.

The cost of the repair, including labor, was only 10 dollars, and the time required was 1 week. *This represented a net saving of 125 dollars and 7 weeks down time. A highly profitable operation, indeed!*

Experiences such as this . . . of time and money saved in welding cast iron with Ni-Rod electrodes . . . are daily occurrences at thousands of welding shops throughout the nation. The reason for Ni-Rod's popularity with these experienced welders is *dependability*. With Ni-Rod electrodes you get quick, sound, machinable welds in all grades of cast iron . . . usually without preheating or postheating. Ni-Rod works well in all positions; can be used with either AC or DC current.

The best way to find out about Ni-Rod's many advantages is to try it. Order a package today and discover for yourself why *4 out of 5 shops* re-order Ni-Rod, once they have tried it.

Your nearest INCO distributor stocks Ni-Rod in 3/32", 1/8", 5/32", and 3/16" diameters.

Coil-vat speed reducer repaired with Ni-Rod at M & R Dietetic Laboratories, Columbus, Ohio.

For welds you've never been able to make before . . . in high-phosphorous irons; heavy sections—

NI-ROD "55"

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

NEW! NEW! NEW! NEW! NEW!

250 AND 600 VOLT FUSES

INTERRUPT 100,000 AMP!

Type EJ-6 fuse rated 250 volts a-c, 30 amperes (actual size)

...AND THEY'RE LISTED BY UNDERWRITERS' LABORATORIES

These new General Electric Type EJ-6 current-limiting power fuses are for application on 600-volt a-c (and below) circuits where the short-circuit current may reach 100,000 amperes. You get increased protection when you use EJ-6 fuses.

RATINGS Standard NECS size fuses are available in 30, 60, 100 and 200 ampere sizes in both 250- and 600-volt ratings. All ferrules and blades have silver surfaces to reduce contact losses. Fuses will interrupt 100,000 rms amperes total asymmetrical current including the d-c component of fault current.

FUSE CLIPS The new EJ-6 fuses are designed to fit standard NECS fuse clips. Also available are special-design clips that prevent the insertion of other NECS fuses. Short-circuit stresses cannot jar fuses loose from these clips. Protect your equipment and personnel by allowing only fuses of high interrupting capacity to guard your circuits.

For additional information on these new fuses ask your G-E Sales Representative for a copy of publication GET-1819 or use the handy coupon. *Apparatus Dept., General Electric Co., Schenectady 5, New York.*

Section F856-30
Apparatus Department
General Electric Company
Schenectady 5, New York

Please send me your bulletin, GET-1819, that describes the new Type EJ-6 Current-limiting Power Fuse.

Bulletin needed for: Reference purposes Planning immediate project

NAME _____
(Please Print)

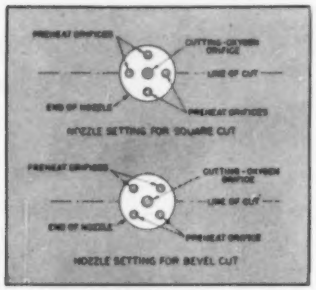
POSITION _____

COMPANY _____

CITY _____ ZONE _____ STATE _____

GENERAL ELECTRIC

through a thickness of metal that is considerably greater than the thickness of the plate. In beveling a 2 in. plate, for instance, the cut actually must go through almost $2\frac{7}{8}$ in. of metal. This greater thickness often calls for use of the next larger size



Nozzle positioning for square or bevel cuts can be guided by the settings shown

of nozzle and higher pressures. Measure the thickness of the metal along the angle of the line of cut. Then consult the blowpipe manufacturer's cutting chart for the proper size of nozzle and oxygen pressure. Too much oxygen will not speed cutting. It slows it down and wastes oxygen.

Hopper Tip Steam Heated to Keep Coal Flowing

BY STEAM-HEATING and insulating only the outlet tip of a 120-t rooftop hopper, the Stauffer Chemical Co., Niagara Falls, N. Y., keeps coal flowing, without interruption, to boiler furnaces in below-zero winter weather. Copper tubing is helically wound around the outside of the hopper tip to carry steam at 340 F. Maximum heating value is obtained from the steam, and waste heat to the atmosphere is eliminated, by encasing the tube-bank in a mineral wool blanket covering. Coal has no chance to freeze at the hopper outlet and continuously feeds, by gravity, to the boiler furnaces below. Coal above the insulated tip keeps pressing downward into the tip as it empties.

Insulation is applied to the conical tip as follows: (1) Two-inch thick mineral wool blankets are cut and shaped to fit the surface of the tip of the cone. Blankets are supplied with wire mesh netting attached on one face and expanded metal lath on the other. The wire mesh netting is installed next to the copper tubing. Adjacent blanket sections are laced tightly together by galvanized wire woven through the abutting expanded lath coverings. (2) A half-inch layer of mineral wool insulating cement is trowelled onto the metal lath. (3) A one-quarter-inch coat of fibrated asphaltic emulsion is applied over the cement. (4) After drying, the asphaltic emulsion

FOR ECONOMY... UTILITY... SPEED

use Ramset System

FASTENING SYSTEM

When fastening into steel . . . concrete . . . masonry

Push costs down and get work finished faster by using RAMSET SYSTEM for most fastening jobs in steel or concrete. Sturdy, dependable RAMSET TOOL instantly sets any one of 65 drive pins or threaded studs. No muss, no fuss, no trouble.

Cost-saving and time-saving advantages of RAMSET are being proved every day by thousands of users . . . with time and costs cut as much as 70% over old-fashioned methods.

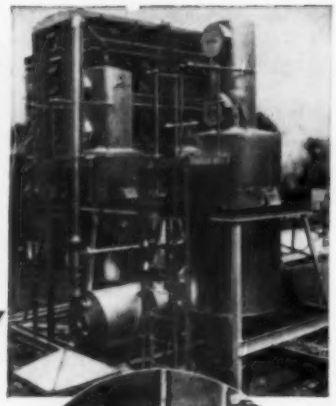
Ask for a 15 minute demonstration and proof of RAMSET'S ability to outwork less efficient driving tools. Call your local RAMSET Specialist or ask us for details.

STEMCO CORPORATION

12117 Berea Road • Cleveland 11, Ohio

PIONEER IN POWDER-ACTUATED FASTENING

Spencer Vacuum Equipment on roof of chemical plant



"Processed by

SPENCER VACUUM"

That might well be the expression applied to the entire operation of blending, mixing, sorting and packaging in this large section of a well known chemical plant.

The major credit however is due to the Chemical Plant Engineer who realized that Spencer Vacuum could pick dried plastic granules out of the oven trays and elevate them to the roof by the ton.

Emptying Trays

He also realized that by picking up two different lots at the same time, they would be mixed automatically in the Spencer "Separator" on the roof. Then gravity did the rest, through vibrating screens and other devices, and then into bags in the shipping room on the first floor.

And this is only one of the "Unusual Uses" illustrated and described in the new 24 page Spencer Bulletin. It shows how industrial engineers apply vacuum to remove liquids, gases, powders, metal scraps, and hot materials. It gives diagrams showing applications such as unloading freight cars, and bottling milk. It illustrates how the machinery designing engineer has improved equipment for making hats, pills, textiles, and for calculating machines.

Ask for the bulletin and see where and how Spencer fits in your plant.

356-C

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER
HARTFORD

is then painted with a prime coat of aluminum paint and the completed installation painted the same color as the hopper.

The main section of the hopper itself is cylindrical in shape, only the lower section being conical. About 50 t of coal per day are used by the plant and this tonnage is daily brought into the hopper by a bucket-type conveyor-elevator. The hopper holds enough coal for several days. Thus, mechanical failure of the elevating system would not result in down-time for the boiler plant.

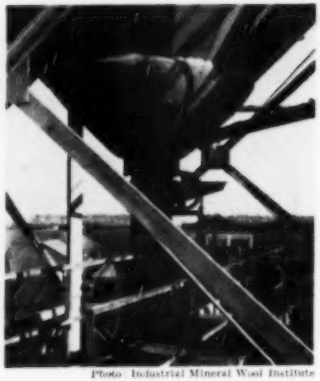


Photo: Industrial Mineral Wool Institute

Mineral wool insulated steam-heated tip of Stauffer Chemical Company coal hopper keeps coal flowing at zero

Similar insulated applications of heat will prevent freezing up of outdoor hoppers having other purposes—for example, handling ores, granulated chemicals and building products.

Color Used in Ion Exchange Bed

Contributed by Rohm & Haas Co.

A NEW CONCEPT in deionization—the use of a special dyed mixture of Amberlite resins which change color as the bed becomes exhausted—has been developed by our company.

This Monobed technique delivers water extremely free of ionic impurities by a single passage through the bed of exchangers. This technique provides complete deionization, yielding a product with a mineral content of less than one part per million from ordinary faucet water. Addition of the new indicating feature affords a simple means of checking qualitatively the exhaustion point of the bed.

Dyed a dark blue in its regenerated state, tthe Monobed becomes a yellowish brown when exhausted. The user, operating such a bed in a transparent tube or vessel, can watch the latter color travel slowly down the bed as exhaustion advances.

MICRO PRECISION SWITCHES for Production Short Cuts

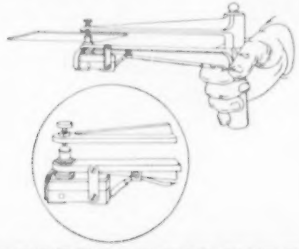
MICRO :::
First name in precision switches

MICRO precision switches, with their easy adaptability to hundreds of plant uses, are increasingly favored by production men as an economical way to improve the efficiency of present plant equipment.

Illustrated on this page are a number of these simple production short cuts by which plant engineers have found MICRO products invaluable time-saving aids. Write for "MICRO TIPS," which contains many more proven applications.

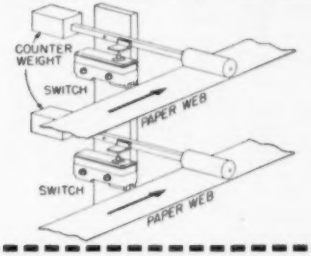
1 MICRO Precision Switch Assures Quick Gauging of Sheet-Metal Thickness

Switch is wired to lamp and battery in the handle. Oversize metal actuates the switch and lights the lamp. A thumbscrew adjusts gauge to thickness of sheets to be checked.



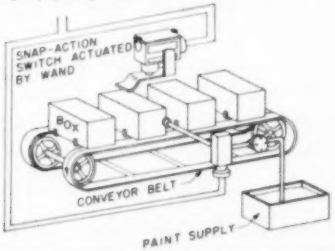
2 MICRO Precision Switch Stops Machine if Paper Web Breaks

Break in paper web of this paper-converting machine allows roller arm to drop. This actuates the switch and stops the machine before any damage is done. Counterweights keep pressure of roller on paper at smallest possible pressure.



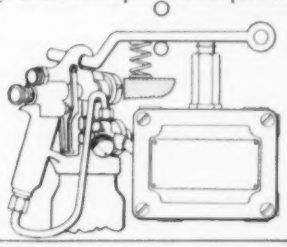
3 MICRO Precision Switch Stops Spray if Carton not in Place

Switch is located in front of the spray nozzle and is actuated by the cartons on the conveyor. When there is no carton to actuate the switch at the spray coating station, the switch shuts off the spray pump motor.



4 MICRO Precision Switch Assures Spray Booth Ventilation

Removal of spray gun from the hook automatically starts motor which drives ventilating fan in the spray booth. Fan stops when spray gun is returned to the hook. Switch shown is a MICRO explosion proof switch which should always be used in explosive atmospheres.



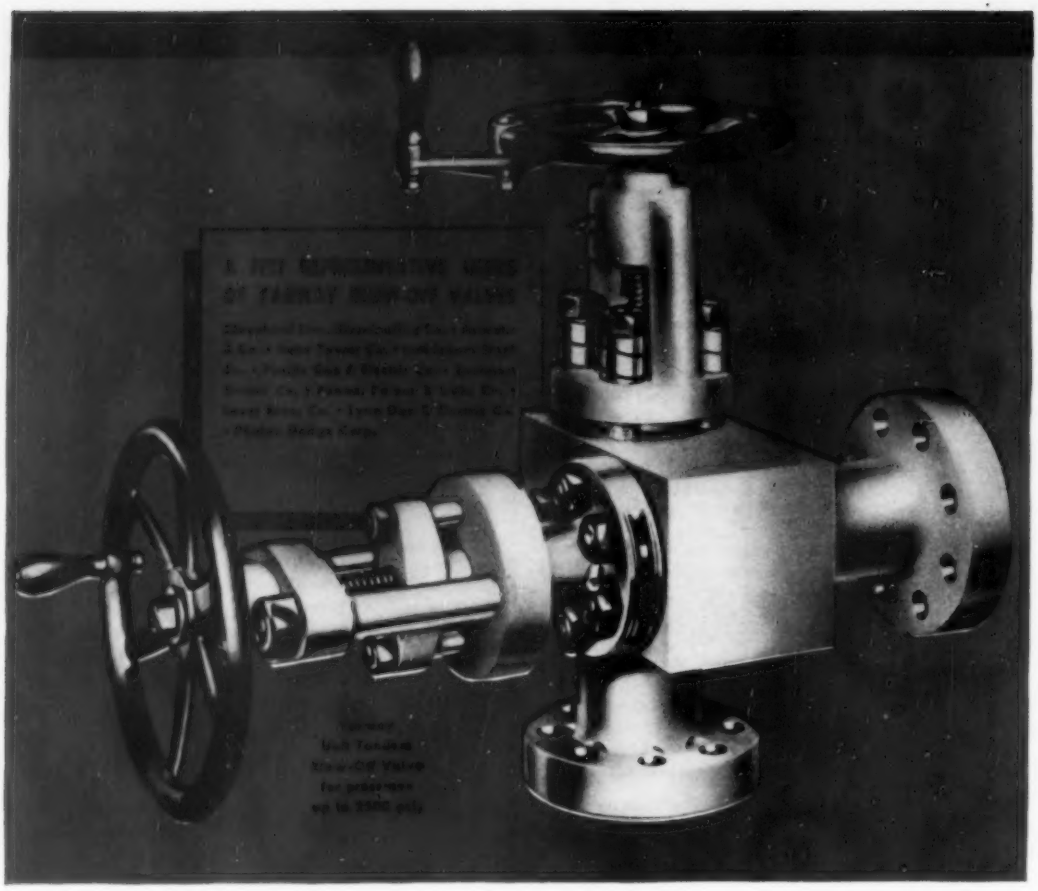
MICRO SWITCH Distributors with complete stocks are located in ninety-nine cities to supply you with just the right switch to make your plant operation more automatic. Look them up under "Switches, Electric" in your classified phone book or write:

MICRO MS SWITCH
TRADE MARK
DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.
FREEPORT ILLINOIS U.S.A.

BRANCH OFFICES: Chicago • New York • Boston
Cleveland • Los Angeles • Chattanooga

SALES REPRESENTATIVES: Portland • St. Louis
Dallas • Toronto

Copr. 1950, Minneapolis-Honeywell Regulator Co.



TIGHT! STRONG! for even toughest blow-down requirements

The Yarway Unit Tandem Blow-Off Valve meets the most demanding requirements for boiler blow-down or drain service.

It's drop-tight—and rugged enough to withstand the severe punishment of regular or emergency blow-down under pressure, or periodic acid wash.

Two Yarway Stellite-Seat Hard-Seat Valves or a Hard-Seat (blowing) and Seatless (sealing) Valve are combined in a one-piece forged-steel body. Designed for pressures up to 2500 psi.

It is significant that more than 4 out of 5 high pressure boiler plants use Yarway Blow-Off Valves.

For more facts, see Yarway Bulletin B-432.

YARNALL-WARING COMPANY
145 Mermaid Avenue, Philadelphia 18, Pa.
Branch Offices in Principal Cities

YARWAY **BLOW-OFF VALVES**

PLANT LIGHTING

Its Cost and Its Maintenance

Periodic cleaning and replacement vs. complete replacement before end of rated life . . . Factors to consider in choosing type of replacement schelule . . . Analysis worked out on basis of a 1000-lamp installation . . . "Cost of Lighting" analysis chart helps pre-determine charges

By R. M. SMART, Division Engineer, Lighting Products Div., Sylvania Electric Products, Inc.

TWO GENERAL methods of planned lighting maintenance are in extensive use today, one involving periodic cleaning of equipment with the replacement of lamps as required, the other involving periodic cleaning of equipment and periodic lamp replacements before the end of rated life of the lamps. The plan to be adopted depends on a cost analysis of both methods together with any variations of these methods that are found to be worthy of consideration.

It is interesting to note that most of the maintenance organizations that specialize entirely in lighting maintenance employ the second method. Since the success of their operation depends entirely on their operating economy, and since they must be concerned with the maintenance of many types and sizes of lighting equipment of various makes, their methods are worthy of consideration.

Type, design and quality of lighting equipment, type and quality of light source, accessibility of equipment for maintenance and availability of equipment for cleaning or lamp replacement, all probably will guide the decision as to maintenance method to be adopted. In any case economy will dictate periodic group cleaning of equipment, particularly in large installations where accessibility and availability of equipment are limitations.

Some operators find it economical to replace lamps individually as they fail or feel that it is false economy to discard a lamp before it fails. Others have an elaborate dating system in which all lamps dated prior to a specified date are discarded at the time of periodic fixture cleaning, lamps failing between cleaning periods being individually replaced.

Still others find that group replacement of lamps is most economical, lamp replacement periods coinciding with equipment cleaning periods when feasible, with individual replacement of the very limited number of lamps failing between replacements, or with no replacement of those few lamps, unless absolutely necessary, until the next replacement period.

A plan of this nature, designed primarily for use with fluorescent lighting systems is known as the Budget Reduction Plan. This plan is based on the following facts:

1. Labor costs, for replacing lamps on an individual basis as they fail, are high.
2. Very considerable savings in labor costs may be effected through budget replacement of lamps all at one time.
3. Fluorescent lamps having remarkably few early failures (less than 5 per cent failures up to 5000 hours of operation on a 3-hr cycle), with excellent efficiency and lumen maintenance, are available.
4. The combination of facts 2 and 3 lead to considerable reduction in the cost of maintenance.
5. The lamp replacement schedule can coincide with one of the regular cleaning periods during a 5000-hr operating period (almost two years on the basis of 10-hr per working day) to effect even greater economy.

Here's how the plan works, using an example, almost any example. For the sake of simplicity the analysis is based on an installation of 1000 lamps. The results then will be on a per-1000-lamp basis.

A. First, determine the labor cost of replacing one lamp. This will vary, of course. Considering the usual routine, a very conservative figure is $1 per lamp. The use of 75 cents will be even more conservative.

B. The cost of replacing 1000 lamps individually, then, will be 1000 X 0.75 or $750.

(Continued on page 60)

Table I. All elements of the cost of lighting are included on this chart

Item No.	General Data	Obtained From*
1.	Total cost of lighting equipment	Equipment supplier
2.	Total cost of installation of equipment	Contractor or estimate
3.	Amortization rate in per cent	Accounting department
4.	Number of fixtures in lighting system	Lighting plan
5.	Watts per fixture	Equipment supplier
6.	Energy cost per kilowatt-hour	Electric utility
7.	Annual demand charge for lighting system	Electric utility
8.	Annual hours of operation of lighting system	Experience
9.	Number of cleaning periods per year	Experience
10.	Unit cost of cleaning equipment	Experience
11.	Number of lamps in lighting system	Lighting plan
12.	Average lamp life	Lamp supplier
13.	Net unit lamp cost (lamp only)	Lamp supplier
14.	Number of lamp replacements per year	$\frac{(8) \times (11)}{(12)}$
15.	Unit cost of lamp replacement (labor only)	Experience
	Annual Fixed Charges or Owning Cost	
16.	Annual amortization of investment	$((1) + (2)) \times (3)$
17.	Annual interest, taxes and insurance	Accounting department
18.	Total annual fixed charges	(16) + (17) or 12.5 to 25% of ((1) + (2))
	Annual Operating Cost	
19.	Annual energy cost	$\frac{(4) \times (5) \times (8) \times (6)}{1000}$ (7)
20.	Annual lamp cost	$(14) \times ((13) + (15))$
21.	Annual cleaning cost	$(4) \times (10) \times (9)$
22.	Total annual operating cost	(19) + (20) + (21)
	Annual Owning and Operating Cost	
23.	Total cost of lighting system	(18) + (22)

* Numbers in parentheses are item numbers.

An Intercom System . . . . . ?
First, Analyze Your Needs

As pointed out by the author, the prime question to be answered by the plant engineer when planning an intercommunication system is: "How much do I need it?" . . . Review of various types available and detailed description of way in which to conduct a plant analysis to determine individual needs and desires . . . Results of investigation and forms used

By **WILLIAM J. O'CONNELL**, Process Engineer

NOT GENERALLY thought of in the plant engineer's regular category of items is the intercommunication system. Nevertheless, the planning, sometimes the installation, and very often the maintenance, are his responsibility. Installation and maintenance present nothing outside of the normal day to day problems that meet his electricians, but the planning is another matter. This must be the result of careful thought, thorough discussion, and able and diplomatic handling.

The prime question in the decision to install an intercommunication system is not "Do I need it?" but "How much do I need it?" Nearly every plant needs such a system, but only when the convenience outweighs the expense should the system be installed. The same careful thought should be given in contemplating the expansion of an existing system. In either case the bigger danger is bulkiness. No intercommunication system at all is better than one where bulkiness has robbed it of all the advantages. An intercommunication system should supplement the telephone, not replace it.

There are various types of intercommunication systems, but for the sake of brevity and clarity, only one type will be the subject of this article. Regardless of which type system is contemplated, the same steps as noted here will assist in formulating the final decision.

A survey made by the author will serve as an illustration as to method, action, and result.

In the plant surveyed, a medium-sized plant of 1500 employes, it was desired to expand an existing system. The original system consisted of ten men on one line, all interconnected with, and able to call and converse with, one another. The circuit carried the following personnel: president, vice-president, treasurer, factory manager, chief engineer, plant engineer, purchasing agent, auditor, sales manager, and the chief inspector. The system had been installed upon a decision by the president, and he had also chosen those who were on the system. After more than a year of operation, it had not achieved the hoped-for results, so it was decided to make a survey and act accordingly. The original premise was that an expansion of the system was necessary to develop the needed efficiency.

The first step taken was to poll each person on the existing system for their preferences in any revision. The president decided he could eliminate the auditor but would like to have the production manager, the assistant sales manager, and the assistant chief engineer included in his circuit. The vice-president had no revisions to recommend. The treasurer wanted a departmental

These are the forms used by one company to determine its present and future needs for an intercom

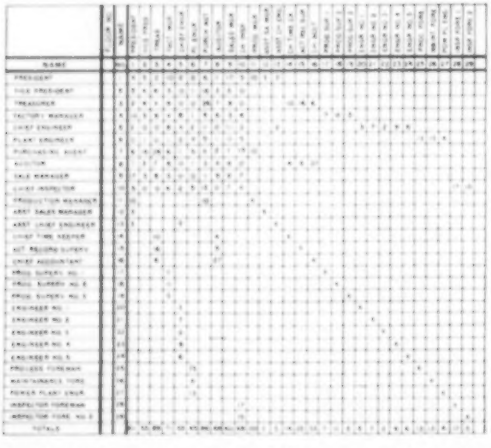


Fig. 1. The two week record, made by every man interested in the intercommunication system, translated into chart form

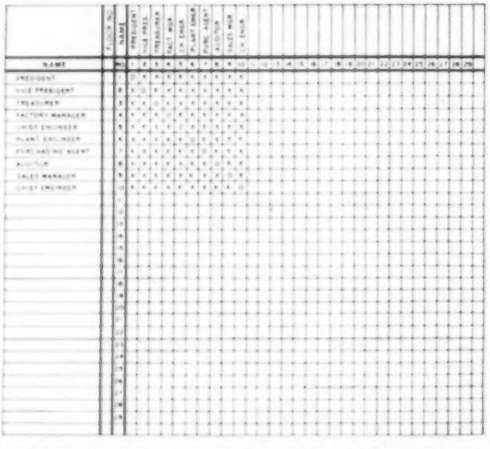


Fig. 2. Original system prior to changes. Total number of keys in use was 100, but system was not entirely efficient

system in which he and the auditor could intercommunicate with the chief time clerk, the accounts-receivable supervisor, and the chief accountant. He also requested that these people be able to intercommunicate with each other. The factory manager wanted to include in his call the three production supervisors. The chief engineer has an assistant and five engineers he wanted on a departmental system and also connected with him. The purchasing agent also wanted the production manager on his circuit. The plant engineer wanted to be able to communicate with the maintenance foreman, the power plant engineer, and the process foreman, but decided there was no need for them to communicate with each other on the intercom. The auditor and sales manager accepted the existing arrangements. The chief inspector wanted his two inspection foremen on a sub-system with him.

An investigation was then made into the type of units available from the manufacturer of the system in use. The following could be supplied: (a) Boxes without call privileges; (b) Single key boxes with call privileges; (c) 5, 10, 22 key units, one key of which must be assigned to the person with the station. This permits on the respective boxes, 4, 9, 21 call stations.

Since the units are to be assigned only to supervisory personnel, none are intended to be used by more than one person. If this information were to be used as the basis to remodel the existing system, eight new 22-key stations would be required, as well as additional wiring, relocation of existing stations, and additional units of the no-call type, single-key or five-key type.

Before proceeding further, it was then suggested that each person on the existing system keep a two week record of the number of times they spoke and with whom they spoke over the existing system, and also, the number of times each person called, or was called by telephone by those already on, or those who wanted to be on the enlarged system.

At the end of the two week (10 day) period the reports were received for analysis. The results of this analysis were highly informative and served as the basis for the final plan of the system as it was ultimately revised. Following is an analysis of the data supplied by the ten reports:

Where the offices were on the same floor, personal contact was preferred. This was the rule between those of nearly equal position, but did not hold true, for example, between the treasurer and the accounts receivable supervisor, a subordinate.

The office building consisted of three floors. On the top floor are the president, vice-president, treasurer, auditor, chief time clerk, accounts receivable supervisor, and chief accountant. On the second floor are the factory manager, sales manager, chief inspector, plant engineer, assistant sales manager, and process foreman. On the first floor are the purchasing agent, and the production manager. The engineering department is at the other end of the plant. Offices in their production areas are used by the three production supervisors and the inspection foremen.

The president, vice-president, and treasurer carried on very little conversation with each other over their intercommunication system. When contact was necessary, office visiting was the rule rather than the exception. When one did use the system to speak to another, the person calling was usually on the phone and required immediate information. The same held true on the second and first floors. However, the importance of the telephone calls, usually long distance, justified contact between each other.

(The analysis of each individual's circuit was arrived at not only from his report, but also from personal discussion, and what follows is the result of several rewrites, a number of conferences, and a final agreement, with the president concurring. In no other way was it possible to reach a decision.)

It was decided the president could drop the plant engineer and the auditor from his circuit. Although the chief engineer and he had contact only twice, the conversations were important and necessitated the quick contact possible only with the intercommunication system. In addition to the ten telephone conversations with the production manager, there were several office visits, some of which might have been eliminated if the production manager had a station.

On the basis of the check, he also decided to eliminate the assistant sales manager from his list, since the three telephone conversations were strictly routine and were easily completed by telephone. Despite only three conversations with the assistant chief engineer, the president still requested his addition to his line. The assistant chief engineer was directly responsible for special developments and it was often necessary to have immediate answers to queries, particularly on long distance calls.

system . . . Any plant can profitably use the same types of forms when conducting a system analysis

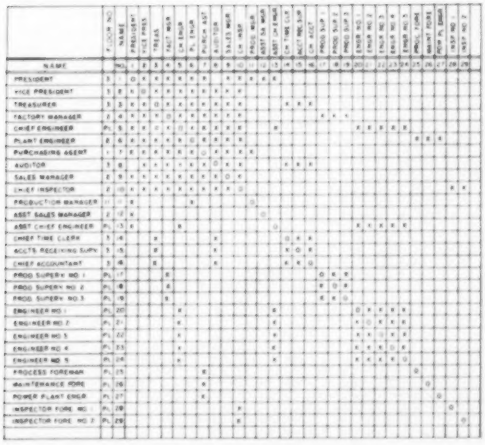


Fig. 3. This is the expanded system as temporarily determined by analysis of chart, Fig. 1. Total number of keys, 209

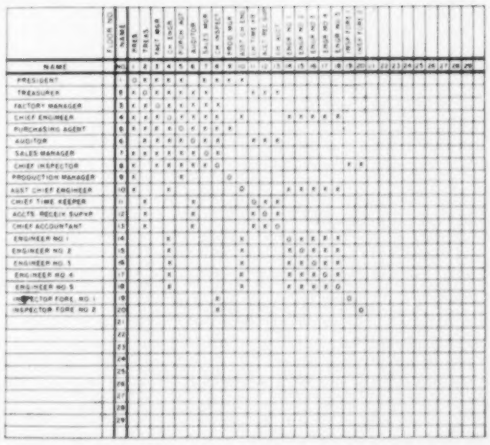


Fig. 4. System as revised and ultimately installed following the survey. Total number of keys has been reduced to 144

The vice-president agreed to eliminate his station entirely on the condition a conference telephone line be installed. The times his station was in use, either calling or being called, were few with the exception of the purchasing agent; and most of the times his system was used, a conference telephone hookup would have handled the conversations more advantageously.

The contact with the purchasing agent occured mostly during the last week of the month, one of the weeks during which he kept his record, and the rest of the month very little contact was maintained. After consultation with each other, the vice-president and the purchasing agent decided that typewritten memos, sent by office mail, would be more adequate. There was normally a lag between the time the purchasing agent compiled his data and the time the vice-president requested it. Therefore, the written data would be received by the vice-president in time for his use and also, he would have a record of the data for ready reference, whereas previously it was necessary to refer to the purchasing agent's files.

From the treasurer's report, the suggestion was made that he eliminate the plant engineer and the chief inspector entirely from his line, if the two other concerned were agreeable. This, coupled with the opening provided by the vice-president eliminating his station gave him three empty keys, into which the three staff members could be connected. In answer to a query as to the possibility of substituting single-key boxes for the multiple-key type requested, the treasurer decided that much of the advantage he desired would be lost. Much consultation between each was required, the telephone introduced a lag that at times caused difficulty, and an intercommunication unit would provide nearly instantaneous contact.

As far as the factory manager was concerned, he agreed to concur with any changes to be made that would be thought to improve the system, and also decided not to add the three production supervisors to his own line. The reasoning in this decision resulted from the fact that of fourteen of twenty-one phone calls to the three men, it was necessary to leave messages. These men were normally out in their departments, and therefore not available. In urgent cases, the existing public auto-call could page them.

The chief engineer's report showed low usage of his system. However, for one week of this time he had been away on business, and noted that ordinarily he relied a great deal on his station. Because of the necessity for quick answers to questions on long distance calls its was necessary to have his engineers on his line. The possibility of substituting the to-be-installed telephone conference hookup for this was ruled out because of the confidential nature of numerous calls, and the desirability of the engineer being entirely separate from the person at the other end of the line when giving information to the chief engineer.

The plant engineer used his station very infrequently. Because of this he decided to dispense with it altogether. In addition, noise level readings were taken in the power house and the maintenance department, two of the points called frequently, and in both areas the decibel reading was too high for efficient usage of an intercommunication system.

The purchasing agent showed the greatest usage of the system. Much of his intra-plant contact was through his intercommunication station, because the necessity to see a large number of outside callers each day kept him confined to his office. The production manager, although only two offices away, often tried to see him personally without success. As a result he used the telephone to contact the purchasing agent because he could not wait for him to finish with whomever would be in the office at the time. An intercommunication hookup would be more desirable because it would not tie up the teelphone, used constantly by his secretary for outside calls. It was also decided to provide the purchasing agent's station with a handset for confidential conversations when there were callers in the office.

The auditor showed a balanced usage. With the president dropping the auditor from his system, and the vice-president and the plant engineer eliminating their stations, three keys were available to add the department heads requested by the treasurer.

No changes were to be made in the sales manager's system, with the exception of those affecting the entire circuit.

An investigation disclosed that the stations the chief inspector requested for his foremen would operate more efficiently if these stations were units without call privileges. This arose from the fact that under the existing arrangement, the inspection office's telephones were often busy with each other. If two-way call boxes were installed these would undoubtedly be used in place of the telephone. Since this section of the intercommunication system was requested primarily for the chief inspector's convenience, he could only insure himself a free line by being the only one to have the call privilege.

The final plan of the system as it was installed showed a great saving in units over the original requests. Only one new twenty-one key station was required, this for the chief engineer. The first estimate was eight of that type. Also, only four five-key stations, four ten-key stations, and two stations without call privileges were needed. This was also a great reduction from the original request. The only other expense was that of the additional wiring needed.

The advantages of the final plan are readily apparent. The system has expanded, but within limits. The purchase of new units is at a minimum. The conference telephone hookup provided for an unrecognized need.

A number of units were left with unused keys. These were left that way, since the surveys did not show that any two or more of those with available keys had any need to be connected with one another. Also, this would require additional wiring. Furthermore, no room would be left for additional expansion, should at some time that again be necessary.

In summary, the preceding survey indicates that in the development of a workable and efficient intercommunication system, the following steps are essential: 1—Obtain from each person concerned a preliminary statement as to whom they desire to keep on their system; 2—request that each person concerned keep a record as to the number of times during a determined period they have communicated with the persons desired on their system; 3—analyze the report on the basis of the preliminary request, and recommend changes based not only on the report, but also on personal follow-up; 4—keep in mind that in certain situations other methods or systems have advantages over intercommunication systems; 5—never alienate. A poor impression, a disagreeable manner, or a demanding attitude can throw cooperation out the window; 6—satisfy yourself first, then satisfy others.

Ice Water Cooler

Contributed by
Thomas Trail

SOME YEARS AGO the ice water cooling system for a hotel lobby drinking fountain caused considerable trouble until the fault was corrected by a clever kink.

The system originally consisted of a brine coil (fed from the hotel's central refrigeration system) immersed in a small tank of brine, with the fountain drinking water cooling coil immersed in the same tank. Since the brine temperature was below freezing, the ice water coil frequently froze solid and prevented water being drawn from the fountain.

The remedy consisted simply in removing the brine from the tank and replacing it with fresh water. A coating of ice then formed on the brine coil, and this served to automatically provide sufficient insulation to prevent freezing of the water in the tank or in the ice water coil.

Analysis of Costs for Small Plant Coal Handling

Comparison of costs of coal handling between contracted work, laborer costs, and mechanized maintenance, interest, power and amortization . . . Costs of silo storage with conveyorized equipment, overhead bunkers, or ground storage and the relative merits and disadvantages of each . . . Coal measurement—must it be accurate or not? . . . Handling ashes, or ashes and coal, on the same system . . . Summary

By **WILBUR G. HUDSON**, Consulting Engineer

WHETHER THE investment in coal handling at a small plant is justified is often debatable. From the viewpoint of a return in dollars there may be little or no advantage. A local contractor often will do the job for about $20.00 per car (if no wheeling is involved), or about 40 cents per ton.

It is slow work and each car ties up the siding for a day or longer. A simple unloader extending from between ties, out, and upward, costs about $3000.00 installed. Then, unless there are union complications, a plant laborer as a part-time job will clear a car in two or three hours. For 50 cars per year the total annual cost of unloading then might be—

Labor	$150.00
Power and maintenance	100.00
Interest and charge-off	350.00
Total	$600.00

or 24 cents per ton.

If a plant laborer cannot be used part-time on such work, the first item will be vastly increased. As the coal demand increases, not only should there be mechanical handling but also provision for a reserve storage in a silo, bunker, or outside on the ground.

Rather oddly, the per ton cost of coal handling at the large utility plants, using many thousand tons per year, is greater than for the average small plant, but this is because of the routine of adding fixed charges—which include taxes, insurance, depreciation, interest, and maintenance. Moreover there is a regular coal handling squad which when not unloading coal is engaged in cleaning up, maintenance work, etc., all charged to coal handling. Typical are the costs for a large mid-west utility system where for 14 large stations the average figures, per ton were—

Maintenance	$0.036
Operating labor	0.067
Fixed charges	0.272
Total	$0.375 ton

Figure 1 shows a typical silo storage layout with an inclined shelf providing live storage, and the reserve coal re-handled to above the shelf as it is needed. A silo of a few hundred tons capacity of monolithic or block concrete construction costs $18.00 to 20.00 per ton (1948). The concrete stave construction with turnbuckle tie rods cost about 20 per cent less, but is somewhat less desirable. A steel plate silo is most costly and least desirable because of upkeep. The diameter is infrequently more than 25 or 30 ft because an increasing percentage of coal will not flow out through the floor openings as the diameter increases. Where the desired capacity requires, duplicate silos may be provided.

The cost of a coal handling system for 50 tons per hour including feeders, 65-ft center bucket eleva-

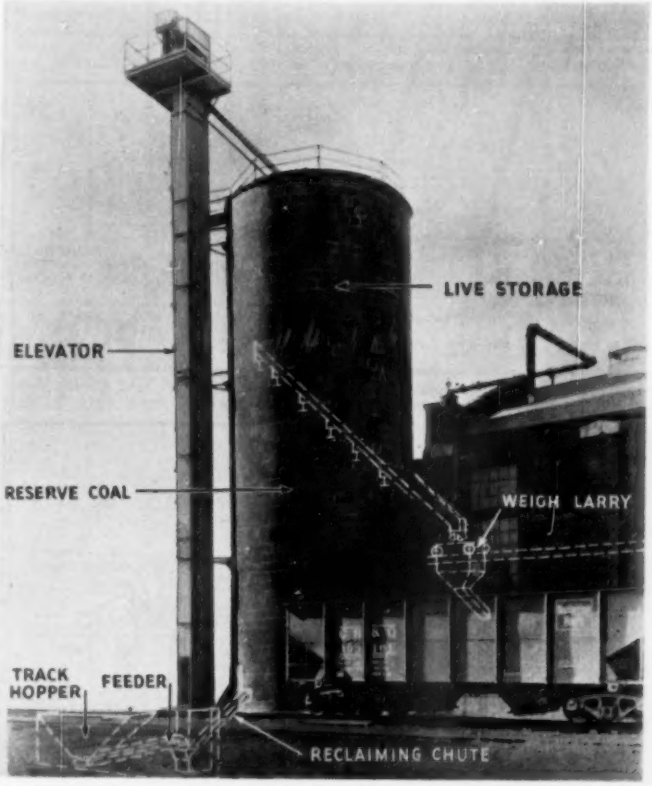


Fig. 1. Typical small plant coal handling and storage equipment with concrete block silo, elevated sloping shelf for live storage, reserve storage rehandled by elevator above the shelf. Distribution to stokers is achieved by weigh larry

tor feeding to a silo (not included), automatic scales and distributing screw conveyor, or the alternate of a weigh larry with runway is approximately $18,000. (1949).

An overhead bunker of the suspension type costs $25.00 to $30.00 per ton of capacity, and its advisability depends much on whether the building frame was designed to accommodate it. Its advantage is that the coal is maintained warm and, usually, free-flowing.

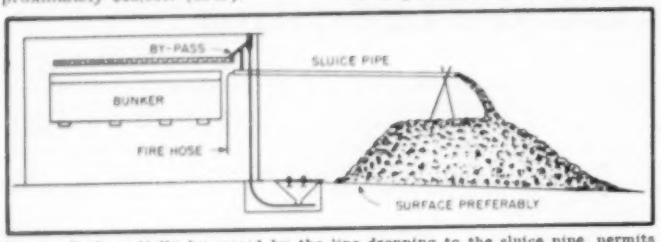


Fig. 2. Coal, partially by passed by the line dropping to the sluice pipe, permits the storage of coal in an inactive reserve. This provides for an emergency supply of a moderate amount of coal at negligible cost. Run off must be watched

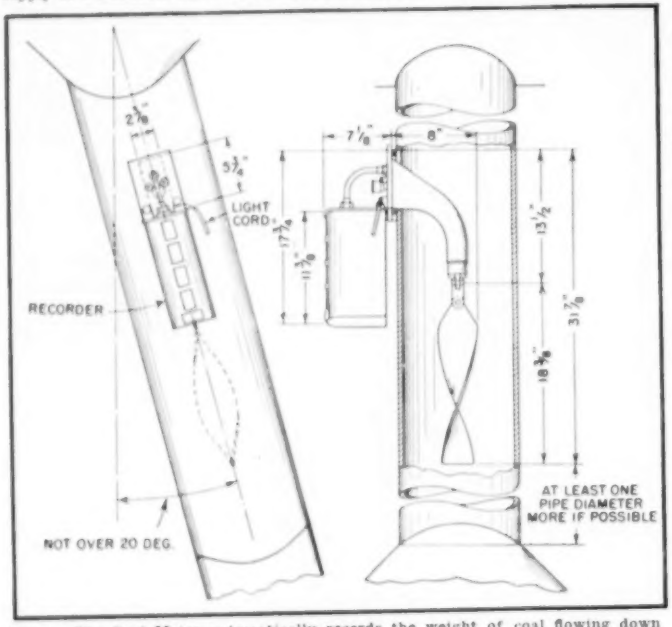


Fig. 3. The Coal Meter automatically records the weight of coal flowing down the chute. Meter is accurate within 2 per cent provided rotor does not spin

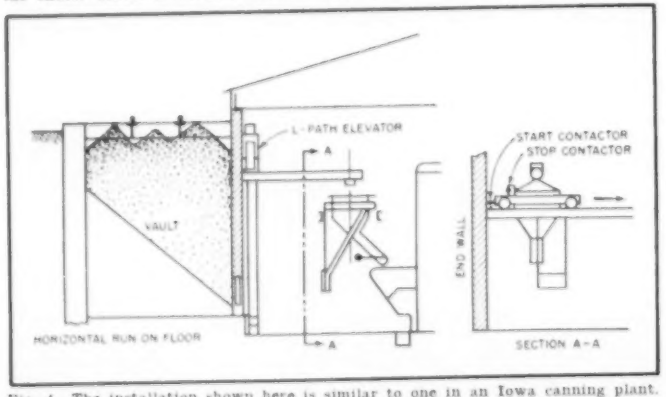


Fig. 4. The installation shown here is similar to one in an Iowa canning plant. It provides for mechanical handling, record of coal burned and conveyor control

Ground storage has some handicaps where winters are severe and, if the pile is adjacent to the plant, wind-blown dust may be objectionable. The characteristics of the coal must be considered. With coal subject to spontaneous heating an outside storage is good since the pile can be rolled to prevent air circulation. In a silo, air may flow up through the gates, heating the coal to the ignition point, which means the formation of a clinker and accumulation of an air-gas mixture in the upper section. That occured in one silo, lifting off the roof.

Loss of heat in ground storage, properly handled, is slight. Joseph Harrington mentions that a 200 t storage pile of ¾ x ¼ in. coal, opened and burned after having been in storage 5½ years, showed through anaylsis a loss in moisture of 5 per cent, in volatile 10 per cent, but only 7/10 of one per cent in Btu. No difference in evaporation between it and fresh coal from the same mine was noted.

Infrequently it may be possible to provide an inactive reserve ground storage of moderate capacity at negligible cost, as shown in Fig. 2. Coal partially by-passed from the elevator discharge, passes into an 8-in. sluice pipe with a fire hose providing the water stream. An estimated 500 gpm gives a capacity of about 10 tons per hour. There must be assurance that the run-off will not incur objections from adjoining property owners.

When considering the installation of handling equipment, the advantage of recording the weight of coal used is considered. Where a variation of 2 per cent either way from exact weight is not objectionable, the simple coal meter, Fig. 3, costing about $200.00, suffices. For greater accuracy—within ½ of one per cent—automatic scales are specified at a cost of about $2000.00 installed. With the meter, which is a calibrated measurer, it is essential that the rotor always be submerged, otherwise it may spin, thus upsetting the reading. The automatic scales automatically control the flow, delivering batches of 200 lb or more, and stopping when demand ceases.

Many of the older small boiler plants in the midwest have an outside trestle alongside, and coal is shovelled from the toe of the piled coal. The simple arrangement shown in Fig. 4, installed at an Iowa plant with five small stoker-fired boilers, functioned very nicely. An L-path conveyor with the horizontal run along the floor, discharges to a short tandem screw conveyor which feeds a 1200 lb capacity weigh larry. When the emptied larry is brought back into loading position a contactor starts the conveyors. When filled, the slight depression of the hopper

actuates the contactor stopping the conveyors.

Sometimes the function of the coal handling equipment may be extended to take care of ash disposal without too much added expense. In Fig. 5 coal from the feeder passes to a vertical runaround pivoted bucket carrier, then to a flight conveyor above the bunker. A drag chain conveyor brings the ashes to the carrier from the opposite side and a by-pass at the top deflects them to storage. This layout was accepted by the purchaser as an alternate to a gravity-discharge elevator-conveyor for coal and a pneumatic ash handling system, priced $6000.00 higher.

Handling both coal and ashes in one conveyor is, as a rule, not advisable. In fact, only the pivoted bucket carrier will do the job without high upkeep costs. However, it is a costly machine. On the other hand, many that were installed forty or more years ago are still in regular service, handling both coal and ashes, with an average maintenance cost (material only) of $0.0004 per ton handled. One carrier over a period of 13 years handled 242,000 tons of coal. Annual repairs were $130.00 or $0.0005 per ton.

For the small plant the investment for coal handling equipment must be moderate, yet reliability of performance and low upkeep cost are factors as important as in the large plant. Usually the handling capacity need not be large. Equipment that will unload a car in an hour or two—say 50 tons per hour—is within reason as regards first cost. The continuous flow type of elevator-conveyor is lowest in first cost, but high in maintenance if the coal is corrosive.

A well designed bucket elevator costs more but requires less power and has low upkeep. An inclined belt conveyor with its supporting structure costs more than an elevator, requires about the same power and is low in upkeep. Oil-sprayed coal will ruin the rubber belt cover within a few months, but the synthetics, such as Neoprene, are affected slightly if at all. Calcium chloride, sometimes sprayed on coal to retard freezing, does not affect the rubber cover but is injurious should it get into the cotton duck carcass. The old reliable screw and flight conveyors do a good job and still are favored by many. The pivoted bucket carrier is too costly except for circumstances such as were related for Fig. 5. The pneumatic conveyor requires far more power than any mechanical conveyor of equal capacity, and for power plant coal handling it has no compensating advantages, so this application is rare.

In sections where winter temperatures frequently approach zero, the increased labor cost of unloading coal from hopper bottom cars becomes a serious factor. Large plants frequently employ a vibrator or car shaker to loosen semi-frozen loads, but the cost ($6000.00 for the machine plus the cost of a frame and hoist) is too much for the small plant. Moreover a deeply frozen load cannot be shaken loose.

(Continued on page 60)

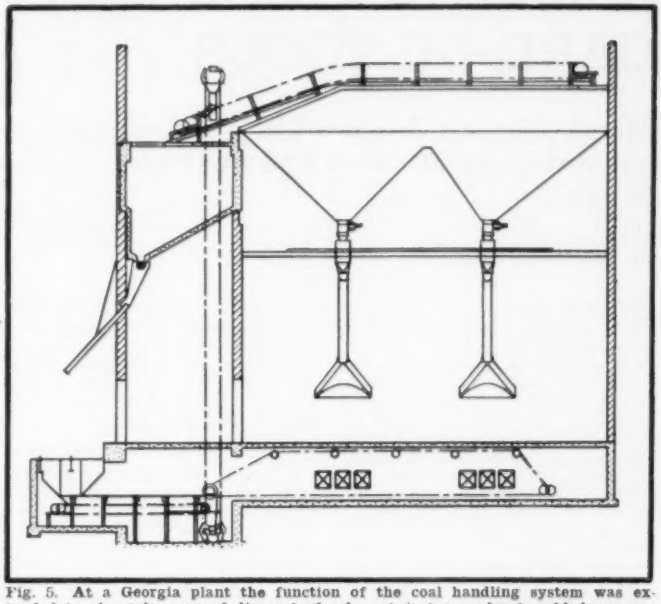


Fig. 5. At a Georgia plant the function of the coal handling system was extended to also take care of disposal of ashes at just a moderate added expense

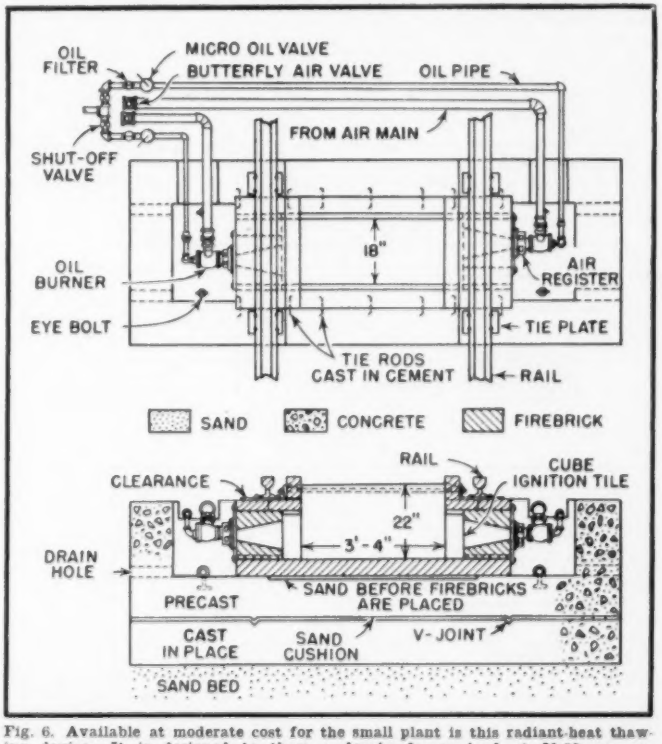


Fig. 6. Available at moderate cost for the small plant is this radiant-heat thawing device. It is designed to thaw a deeply frozen load at $1.00 per car

SELECTION, USE AND CARE OF TOOLS

Metal-Cutting Saws—They are rugged, but watch types, sizes and methods of use

By **THOMAS TRAIL**, Maintenance Engineer

SAWS MOST frequently employed in the shop are the hack saw and the metal cutting type of wood saw. In choosing a hack saw, be sure the frame is strongly built and sufficiently rigid to hold the blade in alignment. The handle should be comfortable and so positioned as to apply steady pressure to the blade throughout the sawing stroke.

The blade stretching mechanism should be simple but rugged and should permit easy removal, replacement and tensioning of the blades. All joints in the frame should be securely riveted or welded. Hacksaw frames for general sawing are usually arranged to take at least two lengths of blades, generally 10 and 12-in. sizes.

For sawing in close quarters, a special frame is available having minimum dimensions. This frame is non-adjustable and takes only 10-in. blades.

When selecting a metal cutting wood saw, see that it is taper ground from the teeth to the back edge of the saw. If the saw is thus thicker at the teeth than at the back edge, binding in the slot will be minimized. Metal cutting wood saws are generally intended for cutting only soft metals, nails embedded in wood, etc. They are made in hand saw type and in a narrower blade style similar to a compass saw.

One Best Blade for Each Job

It is very important, for best results and to prolong the useful life of hack saw blades, to select and use the proper type blade for each sawing operation. In sawing material thicker than $\frac{3}{4}$ in., such as cast iron, machine steel, aluminum, brass, copper, bronze and slate, use a blade having 14 teeth per inch. As shown in Fig. 1, teeth of this coarseness will provide sufficient chip clearance to prevent clogging of the teeth.

For similar material, and annealed tool steel and high speed steel, between $\frac{3}{4}$ and $\frac{1}{4}$ in. in thickness, 18 tooth blades should be employed. Where drill rod, pipe, conduit, tubing, light structural shapes, metal trim, etc. thicker than $\frac{1}{8}$ in. are being cut, select a blade having 24 teeth. As shown in Fig. 2, it is important in all types of metal sawing to use a sufficiently fine toothed blade to insure a minimum of two teeth on the metal section.

In sawing metal similar to that for which a 24 tooth blade is recommended, but where the thickness of the material is less than $\frac{1}{8}$ in., use a 32 tooth blade. This will prevent the teeth straddling the work, as would be the case were a blade used having coarser teeth, as shown in Fig. 3.

In general, coarser tooth blades cut faster, while finer tooth blades cut slower; but use of the latter type results in less risk of tooth breakage.

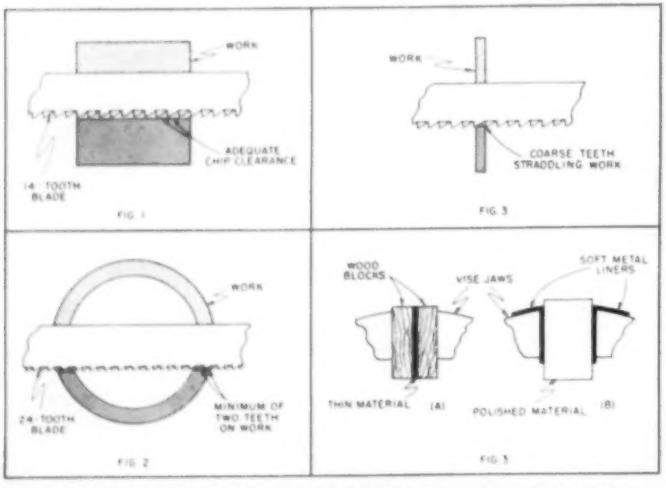
Usually, 10 in. blades are made in 18, 24 and 32 teeth per inch, while 12 in. blades are made in 14, 18, 24 and 32 teeth. Blades are made from various types of steel depending upon quality. Some blades are hard, others are softer except for the cutting edge. The latter type, generally referred to as a flexible or unbreakable blade, is preferable for general repair work since it can withstand considerable abuse without being damaged. Blades made of high speed steel are available where considerable fast sawing is to be done.

Correct Use of the Saw

In using a hack saw, have the work securely clamped or held so that it cannot move, because the slightest movement will result in jamming of the blade, with consequent breakage if a hard blade is being used, and serious kinking if the blade is of the flexible type. Fig. 4 shows the recommended manner of holding various types of work in a vise for sawing.

To use a hack saw correctly, see that the blade is properly positioned so that the teeth face forward, and that it is held firmly and under sufficient tension to make the blade tight in the frame. Saw with slow strokes and even pressure, applying sufficient pressure on the forward stroke to cause the teeth to cut properly and lifting the blade slightly on the reverse stroke. Do not let the blade twist or bend and see that the work does not bind the blade. Be very careful on the last few saw strokes to prevent the saw suddenly cutting through the metal while under considerable pressure, as this may result in blade breakage and injury to the user's hands, caused by the rough edges of the work.

When the saw is not in use, release tension on the blade and wipe the blade and frame with a cloth moistened with a few drops of lubricating oil. This will help protect the metal from rusting. Be sure to tighten the blade and examine it and the frame each time it is to be used.



If blades of proper tooth thicknesses are not employed, or if methods of use are not correct, much of the saw's effectiveness will be lost, and material wasted

MAINTENANCE OF Roofs, Walls and Floors

Cleaning and patching of roofs . . . Cleaning of gutterspouts . . . Extending roof life expectancy . . . Wall washing techniques . . . Scheduled painting, exteriors and interiors . . . Maintenance of floors . . . Care and preservation of concrete, terrazo, wood flooring . . . Special procedures for asphalt, rubber and Koroseal tiling . . . Scrubing and waxing procedures and materials . . . Advantages of premixing

By **WILLIAM P. SHEEHY**, Maintenance Engineer, and
THOMAS C. RICHARDS, Manager, Elevator Operation and Maintenance, and Plant Cleaning
The B. F. Goodrich Co., Akron, Ohio

FREQUENT, at least monthly, inspections of roofs will disclose need for minor repairs—the stitch in time which if made promptly will save greater expense later and which may be the means of averting loss of materials within the buildings.

The cleaning and care of roofs will vary greatly with the type of roofs, operations and surroundings. Some roofs, downspouts and gutters, must be checked more often than others due to the exhaust from manufacturing operations or careless habits of employees in higher surrounding buildings. For the most part all roofs and downspouts should be checked and cleaned on an average of once a month. The majority of the roofs require little care as the elements take care of that. However, some require sweeping off accumulations of pigments, etc., and others cleaning with a hose where these roofs adjoin the office and dirt would be blown from roof into the office.

Roof repairs can best be made by men trained for the work. They know how to handle and apply the various and sundry coating and repair materials and recognize the hazards attendant to working in high places or on special scaffolding. It is not likely that re-roofing jobs can be handled by the usual small crew of roof repair men which the average plant employs; therefore it is advisable that such jobs be contracted to reputable firms who specialize in work of this nature. The same procedure is often followed when a roof needs recoating or painting. The widespread use of so-called built-up roofs for factory buildings makes recoating a profitable enterprise and should be scheduled for periods of not over three years.

The average roof has a life expectancy of from 10 to 20 years. The same roof treated in regular 3 to 4 year periods with a good roof coating can last twice as long or often longer.

It has been established that taking into consideration all preparation of the roof, cleaning, nailing down loose edges, etc., on the average two men can apply a roof coating at the rate of 3 squares per hour, using the brush method. On the average, 2 men can apply 10 to 12 squares per hour using the spray system. Naturally, these are averages. For instance, the two men brushing on roof coating might cover 5 squares during the first hour and only 3 squares during the last hour.

Except pilasters and other load carrying features of a typical plant building, the outside walls are mainly of glass. It always seemed to us that a pane of glass has for some reason or another been the natural target of stones or other missiles, so consequently a good sized army of glaziers have jobs.

Replacements of window glass and repairs to doors, being jobs which fall under the heading of emergency, especially in winter, do not lend themselves to scheduling or planning. Many plants such as ours require their plant protection personnel watchmen, patrolmen, firemen, to keep constantly vigilant and report to the maintenance organization those places in need of repairs. Red tape and formal orders are kept to an absolute minimum so that the work may be done with the least possible delay.

Wall Washing

Where walls play a vital part in the sanitation program they should be washed down. The number of washings depends on the type finish, whether it is spray or brush painted, or enameled over brick and plaster, or the various types of glazed walls. Control of materials, equipment, methods, time and a thorough understanding of the basic operations is required to produce quality cleaning. The following analysis of wall washing procedures is based upon studies made in buildings of our company properties.

It has been proven by studies that wall washing from top down is a faster method. The usual objection to washing in this manner is that streaking may be caused by excessive dripping of a concentrated solution down a dirty wall. In most instances this can be eliminated by training your men to use only premixed solutions of cleaner and to exercise care in the use of their sponges. Cleaning from top to bottom is easier on the worker than from bottom to top. It is also less fatiguing and faster to clean with a circular motion than with up and down motions, but more care and experience is necessary.

The worker should clean no more than a 3 sq ft area before rinsing. Cleaning too small an area is a waste of time. Cleaning a larger area is unsafe and uncomfortable for the worker. An up and down motion followed by a side to side motion for walls leaves them in a cleaner condition. It also eliminates the necessity of continually checking back to see if any part has been missed. A circular motion on rinsing usually will leave a streaked condition.

Rinse water should be changed after cleaning about 50 sq ft of wall surface. The frequency of changing this water depends upon the varying degree of dirt on the walls to be washed. Lukewarm water should be used in rinsing.

Material to be used will depend on conditions and preference but above all the material should be premixed so as to supply a liquid cleaning solution that will satisfactorily perform the operation required. For all around use we prefer 6-8 Rock Island sponges. If the

This material is based upon an address given by the authors before the Plant Maintenance Show, Cleveland.

walls are not too rough a composition sponge may be used. Two pails, one for premixed solution and one for rinse water, are required per man. On large jobs it is advisable to bring the solution in a tank wagon and have another for clean and dirty rinse water to assure a satisfactory job at a reasonable cost.

Some walls can be cleaned by the use of special bristle brushes attached to light-weight tubing handles serving to feed water with valve control adjustment or by the use of a steam jenny. We have used both of these methods but proper drainage must be at hand and this method cannot be recommended where damage to floors would result. We have tried pressure wall washing and rinsing with flat, trowel-type units with turkish toweling, but walls must be smooth and not too dirty.

The schedules in cleaning vary with conditions but in general it is good practice to wash walls once a year where a high foot-candle lighting is required. Light fixtures should be cleaned every thirty to ninety days, depending on type of lights and conditions. Where sanitation is a prime factor such as in toilet rooms, it is well to clean these walls more often, with quarterly or semi-yearly schedules, if possible. This is not possible in the majority of cases of old installations because of the cost factor but with new improved design and materials schedules can be improved at a lower cost.

Scheduled Painting—Exterior

Painting of surfaces exposed to the weather may easily and readily be scheduled and many interesting ideas and plans are employed. In our plants a five year paint program is religiously followed. This means that all outside exposed wood and metal surfaces which deteriorate rapidly, including fences, vent stacks, ducts, bridges, steel supports as well as doors and windows are painted at least once every five years. In many instances where there exist unusual conditions of exposure, such as acid fumes or excessive moisture, more frequent painting—maybe once every two or three years—is necessary and economical. These conditions being known, the next step, in order to provide maximum protection, is to select a suitable paint.

After several paints are chosen which according to manufacturers' claims seem to possess the proper qualifications they are sent to the laboratory for test. Following this the ones which appear superior are given an actual exposure test.

To control and check the work performed by outside contractors, definite requirements are covered by complete specifications which not only serves to protect our interests but makes competitive bidding easier. Most painting contractors appreciate this provision and like the idea because it assures competitors an even break. Only then are we certain that those out-of-the-way and hidden recesses where wood joins masonry, cracks in woodwork, hard to get at places in steel fabrication will be properly caulked before being painted.

To keep track of each year's progress we simply take our plant layout drawings, and outline those buildings which are painted during the year, each year's work being indicated by use of a distinctive or identifying color. At the end of each painting season the next year's work is laid out, planned, materials procured, and the map marked with dotted lines which are afterwards

Unusual Framing Method for Heavy Piping Runs

A RELATIVELY new system of framing, recently adapted to the task of supporting heavy piping runs, has been erected in a large tunnel installation at G. D. Searle & Co., Skokie, Ill., manufacturers of ethical pharmaceuticals.

Made from steel channel and fittings, the stanchions were assembled on the job to continuous concrete inserts embedded in the ceiling and walls and bolted to the floors. Pipe was then installed on roller pipe supports fitted to the horizontal framing members.

The structure is described as completely flexible, in that variations in pitch or slope are permitted by the mere loosening of the bolts which tightly clamp together the framing members involved. Thus, if changes or additions are desired, these adjustments may be made quickly and easily without the use of special tools.

Another cost-saving feature is the reduction of detailing time generally required when a project of this kind is in the engineering phase, and the elimination of any need for drilling or welding.

Photo: Unistrut Products Co.

The horizontal framing members, holding the piping runs, can be raised or lowered by merely loosening holding bolts and adjusting cross arm

made solid as the work progresses.

Personal desires, likes and dislikes of colors, play an important part in our interior painting program. Where there is no centralized control or scientific treatment of the subject, many whims, some traditional, may be encountered. This is particularly true, if the various buildings or departments of a plant are controlled by separate and distinct authority. Standardized colors, proper specifications and craftsmanship are the three musts of up-to-date plant painting. A Paint Standard Guide Book is essential. It soon becomes the painter foreman's best friend, a textbook to which he turns for authority to refuse requests for odd or off-standard color combinations.

It is assumed that such guide and standardization has been submitted to top management for their approval. Thus, the men who ordinarily have authority to change colors at will are themselves bound by uniform procedure. A painting guide, therefore, has many good points, among which are: Uniform appearance of painted surfaces; fewer colors; greater quantity purchases at lower cost; fewer arguments; questions answered quickly; paint code numbers are provided to give instructions to painters instead of trying to tell them what color combination to use; various color combinations used to designate different pipe lines and safety devices.

Color is slowly but surely being accepted as having a proper place in plant as well as office surroundings. No longer is it just white walls and ceilings—a green, brown or gray dado. Many interesting reports have been received from areas where colors have been used to test employee reaction and output.

Periodic washing vs. painting of wall surfaces has been a subject of considerable controversy. We have found that in the majority of cases repainting is as economical and vastly more satisfactory than washing. We might mention some exceptions to this, such as walls of toilets, stair towers, connecting bridges, where dust and grime does not accumulate as rapidly or adhere as tenaciously as in manufacturing areas which are sometimes washed between painting schedules. Make sure of this one thing when painting factory interiors, that the surface to be painted is thoroughly clean. We have tried many schemes—vacuum, blowing, brushing, washing—none entirely effective or satisfactory.

Good paint is often wasted on deep layers of dust, grease and rust, especially on spray jobs. The painter, relying on a blast of air from his gun to remove accumulations, is fooled into believing he has effectively prepared the surface. Because of this many people say "Give me a brush job every time." But the labor cost of brush work in large factory areas should be prohibitive.

The present approach some companies are making in the matter of decorative painting is that more deliberate and careful study be made of the need or justification for the expenditure. Nevertheless, if a crew of from 10 to 15 painters is constantly employed during the summer months to meet outside protective painting schedules that same crew will have no trouble finding plenty to do on the inside to meet winter schedules on such things as machines and fixtures, racks, tables, furniture, offices, toilets, subways, tunnels, elevator shafts, work rooms and aisle lines. In one year we spent $30,000 just so people, trucks, racks,

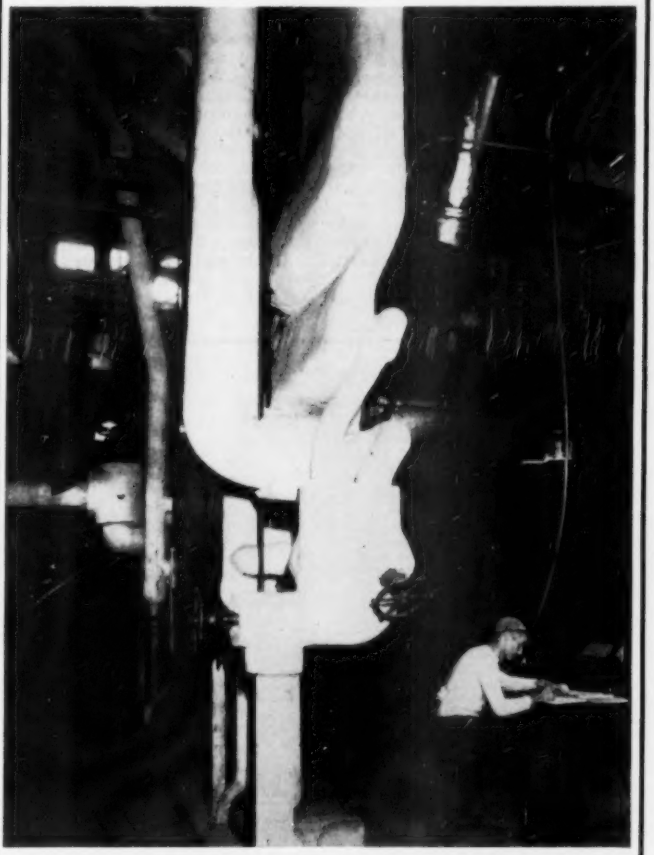
(Continued on page 60)

Entire Pipe Bank Insulated With Blanket to Cut Costs

One chemical manufacturer, when insulating a parallel bank of high-temperature steam lines leading from a waste-heat boiler to an overhead distributor drum, insulated the entire bank as a unit and eliminated the necessity of insulating each pipe individually. This saved installation time, thus reducing costs, and made it possible to complete this phase of the over-all job without ordering special pipe insulation.

The blanket application was completed in two steps. First, 1-in. thick mineral wool blankets, with wire mesh backing on both sides, were wrapped around the entire bank of pipes and secured in place with ½-in. galvanized bands on approximately 8-in. centers. The blankets were butted tightly together and laced with wire through the edges of abutting mesh.

Second, a ½-in. coating of mineral wool cement was troweled over the blanketing to provide a tightly sealed, neat appearing exterior. It was a simple matter to trowel the cement in place over the wire mesh blanket covering.



Labor costs for installing insulation were cut on this job by using blankets of mineral wool instead of insulating each pipe separately

Layout and Planning of Plant Ventilating Systems

Kitchen air must be vented to the atmosphere . . . Computation of kitchen volume and use of table to determine duct sizes, system static pressure . . . System layouts for both small and large industrial kitchens

IN A PREVIOUS article[1] the necessary steps for industrial dining room ventilation planning were outlined. Once the dining room system has been planned the kitchen system can be sketched in. A point to remember when planning kitchen ventilation is that air must be removed from the area and discharged outside the building. Usually, air supplied to the dining room passes through louvers or grilles to the kitchen. Flow from the kitchen to the dining room is never permissible because cooking odors and steam will make the eating space atmosphere disagreeable.

Kitchen volume is computed from the sketched layout and entered in Table I. At least 20 air changes per hour are necessary for kitchens; where odors and vapors are excessive as many as 60 changes may be required. In small kitchens all the air can be removed through the range hood; larger kitchens with extensive dishwashing facilities usually need a few small exhaust fans for these areas. Besides removing undesirable vapors, plant engineers will find that kitchen exhaust systems eliminate much useless maintenance. Paint will not peel from walls of well ventilated kitchens; carbon and grease will not accumulate on ceilings; and wall condensation will be reduced.

Assuming 30 air changes per hour, 24,000 cfm is required. From duct sizing charts a 50 in. by 40 in. rectangular duct is found to be satisfactory. At a 0.07 in. pressure loss per 100 ft, air velocity will be about 2,000 fpm, a low enough value to avoid excessive noise. Although a higher velocity could be used, the increased noise would interfere with effective kitchen operation and reduce personnel efficiency.

As shown in Fig. 1 all air will be removed through the range hood. The hood is 25 ft-8 in. long and 8 ft wide. Slots at front, rear, and one end are used for air intake, as is customary. To provide an equal suction across the hood face, entrance velocity should be low, about 500 to 700 fpm. Computing as shown in Table I it is found to be 510 fpm. Hood entrance loss is then computed using about 2.55 heads as shown.

Elbow and straight duct resistances are calculated next, using Table II of Part I of this article for finding elbow equivalent length. Adding a 10 per cent safety factor the required static pressure is ¼ in. H_2O. With an 1800 fpm outlet velocity, about 3.75 hp will be required to drive the fan. Such a unit will maintain a cool atmosphere in the kitchen throughout the year.

These calculations are typical for normal kitchens. Where small window-mounted exhaust fans are used for dishwashing rooms and similar areas, the calculations necessary are about the same as given here except that slot area need not be considered. In all cases where grease filters are used ahead of the fan inlet the pressure loss through the filter should be included in the resistance. It is customary practice to install a sediment trap at a convenient point in the duct leading to the fan inlet. This trap consists of a sheet metal pocket in the bottom of the duct and is best located in the heel of a vertical riser.

In large industrial kitchens with many rooms separated by partitions running to the ceiling, plant engineers will find that layouts such as that shown in Fig. 2 are helpful. A main exhaust duct is fitted with three or more branches. One branch

[1] See May issue, Plant Engineering, page 54.

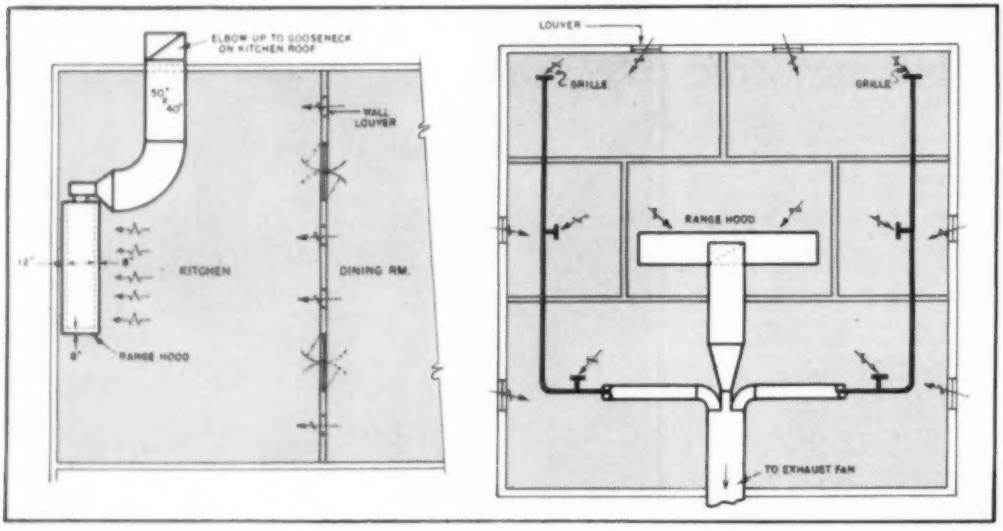


Fig. 1. Left: Typical small industrial kitchen ventilating system layout. Fig. 2. Right: Ventilating system for large industrial kitchen with many smaller individual rooms. Louvers admit air from the surrounding area to the kitchen

runs to the range hood and the others to various rooms such as dishwashing, meat preparation, pot and pan storage, steam tables, etc. The advantage of this type system is that individual control of air flow from each room is possible. Planning calculations are similar to those for dining room systems as given in Part I of this article. It should be noted, however, that air is being exhausted from the kitchen instead of being supplied to it. Wall louvers located about 8.5 ft above the kitchen floor are generally used to permit the inflow of ventilating air from surrounding areas. Moderate velocities, about 500 to 600 fpm, are best for these grilles.

Refrigerated spaces for food storage are never ventilated by means of ducts and fans. Normal opening and closing of refrigerator doors provides a sufficient number of air changes to prevent odors. During long kitchen shutdowns it is advisable to remove food from large refrigerators, shut down the cooling equipment, and leave the doors wide open. Ventilation of the space will thereby be insured.

When locating fan outlet ducts from kitchen exhaust systems it is general practice to keep them as high above the ground as possible. In no case should the outlet ever be less than 8 ft above grounds or sidewalks which are extensively populated. Kitchen exhausts which discharge into narrow alleys or roadways between buildings are seldom satisfactory because odors and vapors spread to adjacent buildings and annoy occupants. Roof outlets fitted with a full gooseneck have been found to be the best means of industrial kitchen exhaust fume disposal.

Fans for kitchen and dining room service can be either direct connected or V-belt driven. V-belt drives are usually more economical from an operating standpoint because they permit use of the proper horsepower motor and the correct fan speed. Direct connected motors must operate at synchronous speed, which is not always the best fan speed. Of course speed controls can be purchased.

Plant engineers will find that the data presented in these articles are helpful in industrial dining room and kitchen planning. By a thorough study of the ventilating problem, several solutions can be evolved from which the most economical can be chosen. The resulting savings are well worth the effort required.

Table I. This table can serve as the basis for calculations of duct sizes and static pressures for most sizes and types of industrial cafeteria kitchens

Typical Planning Calculations for Industrial Kitchens

Dimensions	Length Ft	Width Ft	Height Ft	Volume Cu Ft	Air Changes Per Hour	CFM
Kitchen	30	100	16	48,000	30	24,000

Duct Sizes

Duct Section	Maximum CFM	Friction, in. H_2O	Round Duct Dia.	Rectangular
Hood to fan	24,000	0.07	48 in.	50 in. x 40 in.
Fan to outlet	24,000	0.07	48 in.	50 in. x 40 in.

System Static Pressure

Range Hood:

Entrance velocity $= \frac{\text{CFM}}{\text{Area}} = \frac{24{,}000}{206} = 117$ ft/min over the face

Slot area $= 1$ ft $(25$ ft$) + 0.67$ ft $(25$ ft$) + 0.67$ ft $(8$ ft$) = 47.1$ sq ft

Slot velocity $= \frac{\text{CFM}}{\text{Area}} = \frac{24{,}000}{47.1} = 510$ ft/min

Slot resistance = velocity pressure $\times 2.55$ = hood entrance loss

$= \left(\frac{510}{4006}\right)^2 \times 2.55 =$ 0.0413 in.

4 Elbows, R = 1.5W, 50 in. $\times$ 40 in. =

$4 \times 13 \times W = \frac{4 \times 13 \times 50}{12} =$ 217 ft

5 ft of straight duct to fan inlet = 5 ft

30 ft of straight duct to outlet = 30 ft

252 ft

252 ft at 0.07 in. $\times$ 100 ft of duct = 0.176 in.

0.2173 in.

10 per cent safety factor = 0.0223 in.

Fan static pressure = 0.2396 in.

say ¼ in. H_2O

Pipe Peeper's Periscope

A WATER-COOLED, 12-ft periscope for looking into the fiery exhaust of a jet engine has been developed by General Electric's General Engineering and Consulting Laboratory for use in a test chamber at the company's Aircraft Gas Turbine Divisions at Lynn, Mass.

The quarter-ton steel cylinder allows engineers to watch the pattern of burning gases in the 2500 F exhaust blast. One end of the periscope is placed 10 ft behind the jet engine being studied.

The periscope is jacketed in thick stainless steel, beneath which is a 45 gpm water-cooling system, for carrying away the terrific heat.

A quartz window, both air- and water-cooled, looks directly into the exhaust cone of the engine. The air-cooling system blows a stream of cold air over the quartz window, preventing the exhaust gases from reaching it. The periscope is mounted in such a manner that engineers are able to observe while protected from the exhaust by a wall.

Engineer watches burning gases through special periscope. Shown is hose attachment through which water enters to cool periscope, and motion picture camera for recording photos of exhaust

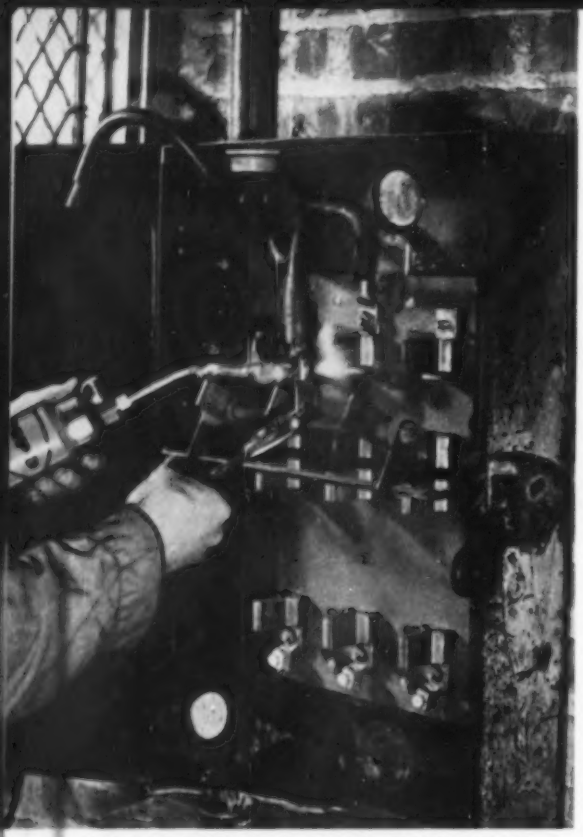


Fig. 1. Sweating lugs on cable is one job which becomes easy with the new torch. 2200 F flame quickly tins the cable and fills the lugs with solder. No priming or pumping needed

1 New Fuel
+ 1 New Container
+ 5 New Attachments
= A Blow Torch, Dip Pot, So

A SELF-PRESSURIZING FUEL for flame tools and small appliances, plus the tools and appliances to go with it, has been perfected and is now being introduced. The fuel, packaged in a seamless, throw-away container much like a beer can in size and appearance, produces a 2200 F flame in a matter of seconds.

An unusual feature of the fuel is that, like bottled gas, it cannot be poured from the container for there is no way the container can be opened without rupturing it by force. A rubber valve, mounted on top of the container, permits it to be attached to a mating fixture on the torch or other appliance. The container of fuel becomes the fuel tank of the appliance until it is empty; then it is quickly removed, thrown away and replaced by a new one.

Announcement of the new fuel coincided with distribution of the first of several planned appliances which utilize the fuel. The first appliance is an industrial torch which lights instantly with a match, does away with all pouring, pumping and priming characteristics and consequent attendant dangers.

The industrial torch which comes with two easily interchanged burning tips, has myriad uses wherever heat or flame helps make a job easier. The largest tip throws a long, broad flame for work where a great deal of heat is required quickly. The other tip has a long pin-point flame which is ideal for soldering and other work where heat must be concentrated in a small area.

Field tests reveal that workmen in a broad range of industries have given the torch a thorough going-over to test its reliability and ruggedness. Under laboratory and field tests the fuel container withstood more than 15 times the normal operating pressures developed when supplying fuel to the appliance. In order to qualify for industrial insurance and to pass rigid restrictions covering interstate shipments of

Fig. 2. Breaking a tough union that has become frozen from corrosion in the jointed threads is accomplished with the application of a little heat and a few taps with a hammer

Designed for industrial use by electricians, plumbers, pipe fitters, and mechanics, this new fuel, plus several new attachments, brings a new meaning to safety and versatility in the plant . . . Throw-away fuel containers, good for several hours continuous service, are safe, light and clean . . . Maximum heat of 2200 F is attained in 30 to 60 seconds without pouring, pumping or priming . . . Blow torch with two burning tips, one with a long, broad flame, the other with a pin-point flame, is the first of several attachments to be made available; others coming

Soldering Iron, & Refrigerant Leak Detector*

volatile fluids, extensive tests were conducted on safety properties of the fuel and the container.

Pressure characteristics of the fuel and construction of the container are such that it is impossible for oxygen to enter the container in sufficiently large quantities to support combustion. Also, before shipment is made from the fuel loading depot each container of the fuel is individually tested and inspected in compliance with Interstate Commerce Commission regulations.

Among the hundreds of uses to which the torch has been put and thoroughly field-tested are the following: cutting asphalt tile floor sections; breaking frozen pipe connections; sealing tar compound on old storage batteries; removing old, dried putty which so often attaches itself to frame of wooden windows; removal of checked and cracked paint; soldering splices on electrical wiring jobs; sweating-on copper tubing; sweating lugs on cable; soldering fixture bracket nuts; silver soldering, which takes a quick, hot flame.

Now in the final stages of design are several more appliances which will utilize the fuel in the throw-away container. Leading in interest to industrial users are a refrigerant leak detector, electrician's dip pot, and a new soldering iron. The manufacturer states that these will be available in the very near future. Sketches of preliminary designs are shown by Fig. 3. In addition to these and of general interest to all sportsmen, are a camper's lantern and a stove for outdoor use.

* Readers who want more dope on this new fuel, blow torch and soon-to-be-announced dip pot, soldering iron and refrigerant leak detector, may get it by writing "Blow Torch" on the postcard in this issue.

Plant Engineering
Product Application Feature

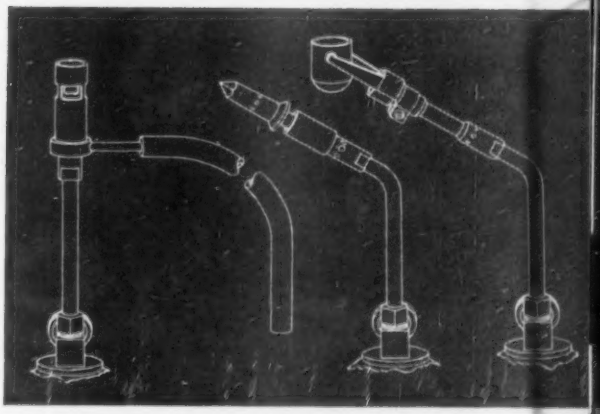


Fig. 3. These three are coming. Not shown in the final form these three applications will take are the refrigerant leak detector, soldering iron and electrician's dip pot, left to right

Fig. 4. Asphalt tile baseboard must be heated through before application to the plastic-treated surface. Asphalt tile floor sections may be cut with a few passes of the torch

When, Where and How to Use
DDT FOR PEST CONTROL

How DDT kills insects . . . Limitations on its effectiveness . . . Concentration and forms to use . . . Methods of application . . . Precaution to take when using DDT . . . Hints on use for all specific applications

WHILE DDT[1] was discovered in 1874 it was not used as an insecticide until 1939. Widespread use by the Armed Forces during the war demonstrated its effectiveness. Later experience indicates that after prolonged and extensive use succeeding generations of flies and mosquitoes develop a partial immunity.

Some insects such as grasshoppers and some ants are little affected.

It remains however, an outstanding development in pest control, killing many insects on contact and when properly applied retains its residual toxic qualities on treated surfaces for weeks and even months. The poison is absorbed through the feet, legs and body walls, and attacks the nervous system, eventually causing paralysis, convulsions and finally death.

Some insects such as flies are killed quickly. Others such as carpet beetle larvae may not die for as long as two weeks but during this period stop their destructive feeding.

DDT in undiluted form is a white, waxy powder with a mild pleasant odor. For an effective insecticide it must be prepared for use and is readily available in oil solutions, in wettable powders, concentrated solutions, dust mixtures and pressure bombs. The proper preparation should be purchased for a specific method of application.

Powder. When mixed with talc and other material the resulting dust or powder is particularly effective for use in cracks and crevices hard to reach with a spray. The powder should contain 10 per cent DDT. Proprietary powders[2] often contain small quantities of other active materials to increase its effectiveness.

Powders should be applied with a small hand dust gun, and blown deep into cracks. A light application should form barely perceptible dust coating. For a heavy application the coating should be plainly visible.

Liquid. Liquid solutions used as a residual spray should contain about 5 per cent DDT. Oil or water solutions may be used. The latter prepared from a wettable powder. Either type can be made from concentrated solutions[2] specially prepared for mixing. One such product sold in 25 per cent concentration, costs in small quantities from $1.00 to $1.25 per gallon of water spray solution. A maximum of 1000 sq ft coverage per gallon is recommended.

Water solutions are cheaper and generally used for industrial purposes. It should be used on shrubs and flowers near buildings where mosquitoes are a problem. Another advantage is that it is non-inflammable. Water solutions should not, however, be used on fabrics, carpets and upholstery due to the danger of staining. For this purpose deodorized kerosene instead of water should be used to dilute concentrated solutions.

In water solutions DDT has a tendency to separate and when left standing for considerable periods, should be thoroughly stirred or agitated to insure complete mixing. On finely finished, painted or wallpapered surfaces, either solution should be used very cautiously because slight staining usually results.

Space Sprays. Space sprays are used to completely fill a room with finely divided particles which kill upon contact with the insect. It is very effective in clearing small areas of flies and mosquitoes. As commonly used, space sprays have little penetration and leave little if any residue on the walls. While DDT is sometimes added to space spray solutions, its value for this purpose is questionable. Such sprays should not contain more than 3 per cent DDT.

Residual Sprays. This is the most effective way to use DDT for most surfaces. The spray dries and leaves DDT crystals which retain lethal qualities for long periods, one of the major advantages of DDT as an insecticide.

While the usual household spray can be used it is not desirable due to the fine atomization or mist, most of which is lost. The solution should be applied with a fairly coarse spray. A shoulder strap pump, sprayer, knapsack, bucket or power sprayer can be used depending upon the area to be covered.

An air-pressure garden sprayer with a capacity of 2 to 5 gal makes an effective unit in most cases. Special nozzles giving a flat or fan shaped spray are usually available. If the regular nozzle is used, the small (No. 3) size plate should be used. A light application should only moisten the surface. For a heavy application use all the solution that will be retained without running or dripping.

Painting. If necessary, painting may be substituted for spraying. Quite aside from this painting is the best method of application for screens.

When using prepared solutions or proprietary products follow directions closely and be sure that it is the proper preparation for the purpose for which it will be used. Table II gives applications for specific insects as recommended in a publication issued jointly by agencies of the Department of Agriculture and the Public Health Service. Additional details for control of specific insects are given below.

Flies breed in garbage and filth so cleanliness and sanitation are essential. Space sprays, pyrethrum solutions are very effective, give quick action. Residual sprays with DDT give protection for several months inside and 2 to 4 weeks outside. Paint all screens.

Where plants are likely to be sprayed or the spray carried to them

Table I. Precautions to take when using or working with various forms of DDT.

1. **DDT is a mild poison and should be stored, handled and used as such.**
2. **Do not apply to eating utensils or food.**
3. **Avoid prolonged or repeated contact with the skin. Wash thoroughly with soap and water after contact and after using.**
4. **Provide adequate ventilation when applying.**
5. **Do not spray oil solutions on animals or near open fires.**
6. **Store out of easy reach and where it will not be mistaken for other materials.**
7. **If taken internally give a tablespoon of soap, baking soda or salt in a glass of warm water to induce vomiting and repeat until the vomit is clear. Call a physician!**
8. **Like other insecticides DDT is not a substitute for cleanliness and sanitation and should not be expected to work effectively in dirty insanitary conditions.**

[1] The chemical name is dichloro-diphenyl-trichlorethane.

[2] While DDT is now available in most localities difficulty is often encountered in obtaining the most effective form for a particular use. Should difficulty be encountered write the Editors or write "DDT" on the postcard elsewhere in this issue.

Table II. Form, concentration and application procedures recommended by government agencies for specific insects. Powder refers to a 10 per cent concentration, solution to a 5 per cent concentration of DDT.

Insect	Recommended DDT Form	Application
Ants	Powder or Solution	Heavy
Bedbugs	Solution	Light
Book Lice	Solution	Heavy
Carpet Beetles	Solution or Powder	Heavy
Clothes Moths	Solution	Heavy
Cockroaches	Solution or Powder	Heavy
Fleas		
In Buildings	Solution or Powder	Light
On Animals	Powder	Light
Flies	Solution	Light
Hornets	Powder	Heavy
Lice	Powder	Heavy
Mosquitoes	Solution	Light
Pantry Pests	Solution	Heavy
Silverfish	Solution	Heavy
Ticks		
In Buildings	Solution	Heavy
On Animals	Powder	Heavy
Wasps	Powder or Solution	Heavy

SPRAYS: A "light application" is sufficient solution to moisten the surface. A "heavy application" means all that will remain on the surface without running or dripping. DUSTS: A "light application" is sufficient powder to be barely visible as a thin film. A "heavy application" is sufficient to be plainly visible.

by the wind, use a water solution as the oil burns plants. In cafeterias and eating places remove all dishes and food and do not replace until the surfaces are thoroughly dry.

Mosquitoes are quite similar to flies in habit and control is similar. However, particular attention should be paid to nearby shrubs and vines. A water solution made from wettable DDT powder can be used without harm to plants.

Roaches breed in cracks and crevices difficult to reach. A combination of residual spray and dusting powder gives best results. DDT acts slower on roaches than on flies and the effect may not be apparent for 2 or 3 days. If they are present after 2 weeks, repeat the application.

Ants can best be controlled by dusting the hills with DDT powder and spraying cracks, crevices, paths where they emerge or pass. DDT is not effective against all types of ants. Carbon disulfide poured in holes in the ground diffuses through the soil and kills ants. On lawns and near shrubs it must be used with caution for it will kill vegetation. Holes should not be closer than 12 in. to plants and on lawns deep enough to be below the roots. Space holes about 12 in. apart, pour in 1 to 2 tablespoons of the chemical, immediately fill with soil and tamp well.

Wasps, hornets and yellow jackets are frequently troublesome. It is best to work at night on their nests. Spray the nests and surrounding areas well and, if the nests can be reached, blow powder into the opening with a small hand duster. Slow and cautious movement is necessary to avoid disturbing the nest, for an irritated wasp is no respector of persons.

Relocating Cranes on Floor-Supported Runways

By H. B. CLARK, Project Architect, Westinghouse Electric Corp.

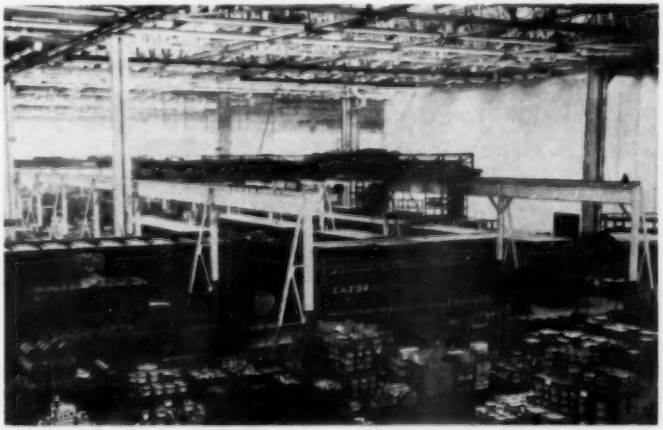
This relocation of the existing tramrails and overhead cranes, while not economical became desirable due to the length of time required by the tramrail manufacturers for delivery of new equipment.

At locations in the plant where the heavy lifts were encountered constantly the overhead crane system was supplemented with 15-ton mill-type bridge cranes installed on new crane runways supported from the floor. These independent structures were necessary since the building trusses could not carry these heavy loads and it was virtually impossible to install cabs on the existing light overhead bridge cranes. The floor-supported type of installation was necessary to transport heavy raw materials from freight cars and docks to the heads of all the production lines emanating from these receiving areas.

This relocation of the cranes accomplished two objectives: first, it reduced the cable swing to a normal distance and second, it made possible a crane system that could lift much heavier loads than could be supported on the existing trusses.

WHEN OUR company purchased the Curtiss-Wright plant in Buffalo all the overhead cranes and tramrails that served the Curtiss operations were included in the purchase. The bridge cranes varied in capacity from 1 to 10 tons and were hung directly to the bottom chord of the trusses. Their direction of motion followed the Curtiss production flow from east to west.

After the Westinghouse machine tool layout was completed the path of the cranes serving this equipment could be determined. In most cases this meant reinforcing the existing overhead structure, removing and reinstalling the runways, and reallocating the various tonnage lifts to the cranes throughout the plant.



These 15-ton mill-type cranes were supported on the A-frames shown because of lightness of steelwork in existing structure. This made heavier loads possible

SAFETY VALVES—
Testing, Installation, Maintenance

Importance of specifying proper relieving capacities . . . Code requirements for installation . . . Deviations in some industries . . . Difference between relief valves and pop safety valves . . . Installation of safety valves . . . Testing and cleaning procedures . . . Changing or adjusting operating pressures . . . Use of rupture discs in line

By W. ELWOOD ROSSNAGEL, Safety Engineer
Consolidated Edison Co. of N. Y., Inc.

ALTHOUGH safety valves are in common use on the various types of pressure vessels in industrial plants they are often misunderstood by men in charge of the equipment these devices are expected to protect.

Fortunately, this situation does not usually exist in the large power and industrial plants. On the other hand, even some design engineers are inclined to look upon safety valves rather lightly. In fact, we have all seen drawings for the installation of pressure vessels which contain a note such as "provide one 2 in. safety valve set at 100 lb," without regard to the actual relieving capacity of the safety valve. The table showing the results of capacity tests on safety valves, published by the National Board of Boiler and Pressure Vessel Inspectors, indicates that 2 in. safety valves, for instance, of various makes and models, when set to open at 100 psi pressure will discharge widely different quantities of steam, varying from 1510 lb per hour to 7190 lb per hour. Keep in mind that all are 2 in.-100 psi safety valves and would meet the requirements of the note on the drawing. Thus, merely specifying the size of a safety valve will not suffice.

When used in steam, air or gas service the safety valve should be set to open at a pressure not in excess of the designed working pressure of the equipment which it is to protect, nor more than 20 per cent above the normal working pressure, whichever is the lesser. Thus, a boiler may have been designed for say 100 psi but is now used only for heating a building and hence requires a maximum working pressure of 15 psi. In this instance, the safety valve should be set at about 18 psi, not 100 psi.

According to the ASME Code, safety valves should always be installed without any stop valves on the inlet or discharge piping, as the accidental or intentional closing of such a valve will render the safety valve inoperative. This Code requirement is as it should be. In the chemical industry, however, a different situation frequently exists. In some processes it is impossible or impracticable to shut down the operations for months at a time, yet it may be a known fact that gummy residues are precipitated inside the piping and valves, including the safety valve, which may thus be rendered inoperative after a short period of time.

In chemical plants, therefore, it is quite common to place stop or "block" valves between the pressure vessel and the safety valve. It is the contention of the chemical engineers that it is far safer to shut the block valve for a half-hour once a month (during which time the operator maintains an extra vigilance at his pressure gauges) to allow the safety valve mechanic to inspect, clean and test the safety device, than to prohibit the installation of the block valve and continue to operate for weeks or months with a safety valve so gummed up that it probably will not work. The "block" valves, where installed, are always sealed open and routine inspections are made to ascertain that the seals remain intact.

Relief Valves vs. Pop Safety Valves

Safety valves are made in two general types, namely, relief valves and pop valves or pop safety valves. The latter two are often called simply safety valves, the relief valves being intended for use with liquids and the latter two with vapors and gases.

The relief valve, Fig. 1, left, is a spring loaded valve which is designed and adjusted to open at predetermined pressure caused by the hydraulic pressure acting upon the underside of the valve disc, and which pressure is resisted by the ac-

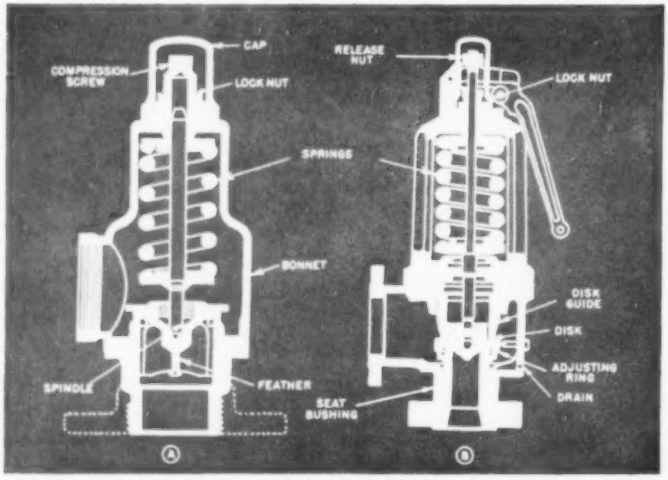


Fig. 1. Relief valves, left, which are used on liquids, are designed to open at a predetermined pressure acting upon the underside of the valve disc. Pop valves have the same type of valve body but are usually employed for vapors or gases

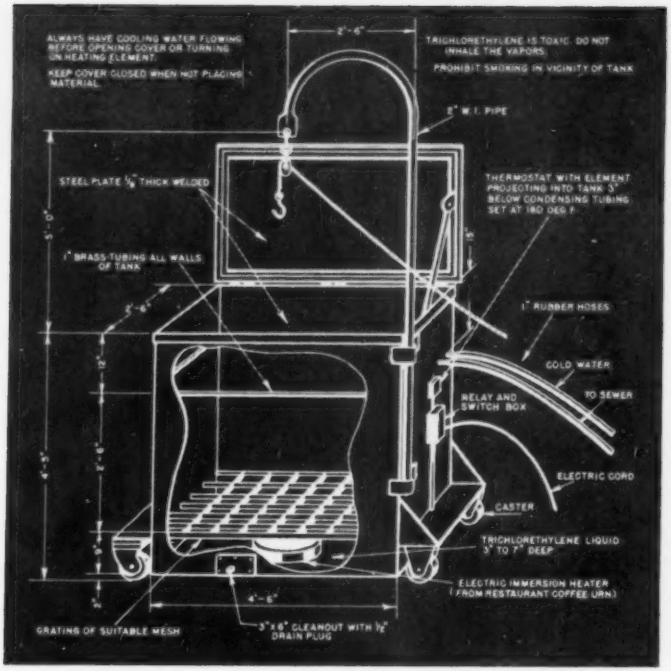

ALWAYS HAVE COOLING WATER FLOWING BEFORE OPENING COVER OR TURNING ON HEATING ELEMENT
KEEP COVER CLOSED WHEN NOT PLACING MATERIAL
2'-6"
TRICHLORETHYLENE IS TOXIC. DO NOT INHALE THE VAPORS.
PROHIBIT SMOKING IN VICINITY OF TANK
2" W. I. PIPE
STEEL PLATE ⅛" THICK WELDED
THERMOSTAT WITH ELEMENT PROJECTING INTO TANK 3" BELOW CONDENSING TUBING SET AT 180 DEG. F.
1" BRASS TUBING ALL WALLS OF TANK
1" RUBBER HOSES
COLD WATER
TO SEWER
RELAY AND SWITCH BOX
ELECTRIC CORD
CASTER
TRICHLORETHYLENE LIQUID 5" TO 7" DEEP
ELECTRIC IMMERSION HEATER (FROM RESTAURANT COFFEE URN)
4'-6"
GRATING OF SUITABLE MESH
3"x6" CLEANOUT WITH ½" DRAIN PLUG

Fig. 2. Degreasing tank, using trichlorethylene vapor as the cleaning agent, may be constructed in the maintenance shop. Note that in operation the cooling water should be flowing before opening the cover or turning on the heating element

tion of the spring. Only a relatively small quantity of liquid ordinarily has to pass through the relief valve before the pressure in the vessel is reduced and the valve reseated. Closing takes place almost exactly at the opening pressure. It requires a built-up or "accumulated" pressure of about twenty-five per cent (above the opening pressure) to cause the valve disc to lift to the maximum opening.

The pop valve, Fig. 1, right, on the other hand, may have the same type of valve body. In fact, it may be impossible from an exterior inspection to distinguish between a relief valve and a pop valve of the same size, although a set screw in the rear of the valve body to hold the blow-down ring in adjustment is usually an indication of a pop safety valve. In the pop valve, the vapor or gas pressure is likewise exerted upon the underside of the valve disc, and at the predetermined pressure it causes the disc to lift off its seat. The fluid which thus passes the valve is not free to pass out the outlet, as in a relief valve, but is trapped in an annular chamber known as a "huddle" chamber.

The top of the valve disc has a flange extending beyond the diameter of the disc proper, and is sometimes cupped downward slightly. In the valve body, surrounding the valve seat, is a "blow-down ring" which fits quite closely around the flange on the valve disc. Thus, when the fluid escapes past the valve it enters this blow-down chamber and exerts a lifting pressure upon a much greater area than initially on the valve disc. This readily overbalances the spring and causes the valve to instantly open wide.

When the pressure in the vessel is reduced, due to the escape of the gas or vapor, to not more than 4 per cent or 2 lb below the opening or "set" pressure, the valve snaps closed again. While blowing, the pop valve should not allow a build-up of more than 5 per cent above the set pressure. The pop safety valve is similar to the pop valve except that it has a lifting lever.

Installation of Safety Valve

On many high pressure centrifugal fire pumps a relief valve is so installed as to by-pass water from the discharge piping back into the suction piping in case all hose nozzles happen to be shut off. In installations of this type the back pressure (in lb per sq in., absolute) should not exceed 25 per cent of the relieving pressure (in like term), and the relief valve is set to open at the difference in the two pressures. For instance, if the fire pump is to operate at 100 psi (115 psi absolute) and the positive pressure in the suction pipe is 10 psi (25 psi absolute), the difference in pressures would be 115 — 25 = 90 psi which is the pressure at which the relief valve would be set to open.

A relief valve used for liquid service is usually located below the top of the vessel which it is to protect. It may, however, be placed on the piping a short distance from the vessel, but if this pipe is to be of considerable length, it must be larger than the nominal size of the safety device. If the vessel is of considerable height and the relief valve is located much below the liquid level, the hydrostatic pressure (.434 psi for each foot below the liquid surface) must be added to the pressure at the surface of the liquid or top of the tank.

On the other hand, good practice dictates that a pop valve, which is used for gas and vapor service, be mounted directly on the highest part of the vessel which it is to protect. It may, however, be located on the piping above the vessel but as close as practicable to it. If mounted on a tee at a right angle to the pipe, the latter should be considerably larger than the nominal size of the safety valve to insure a free flow of the fluid.

The discharge pipe for a safety valve should never under any circumstances be smaller than the safety valve. It should, where necessary, be protected from freezing. Pop valves usually have rain hoods installed when terminating out of doors. When used in steam service, a drain hole should be provided in the elbow at the safety valve outlet.

If the vessel is apt to be exposed to a serious fire the safety valve should be able to take care of the greatly increased quantity of vapor which may thus be unexpectedly produced. Bronze valves should not be installed where the temperatures are liable to go above 300 F.

Testing Safety Valves

All safety valves should be tested at least once a year by an experienced mechanic and more frequently if conditions require. This will ordinarily make it unnecessary (except as required by law) to periodically pull the lifting lever on safety valves so designed, as the periodic testing is far more desirable than the periodic tripping. A record should be maintained of each test.

When the safety valve is to be tested, either at the periodic date or upon a special request by the operator of the equipment, the maintenance mechanic should satisfy himself that there is no pressure in the vessel or piping on which the safety valve is mounted. If, as stated above, there is a block valve under the safety valve, the former should be closed by the operator only after breaking the seal in the presence of the mechanic. If there is no such valve, as is usually the case, the operator should be present when the me-

chanic recovers the safety valve. Caution should be exercised to avoid being burned by chemicals, hot liquids or condensed vapors that may blow or drip out when the safety valve is loosened from the equipment.

If there is a sufficient number of safety valves to be taken care of, an inexpensive test bench, either fixed or portable, may be constructed for the purpose.[1]

Upon removal of the safety valve from its location, it should be cleaned in a degreaser using trichlorethylene vapors, or washed in the liquid to remove all traces of grease and objectionable chemicals. A small degreaser, Fig. 2, can be made, without too much difficulty, in the shop.

Place on the test plate a piece of live rubber about 9 in. in diameter and 3/16 in. thick with a ½ in. hole at the center. On this gasket place the safety valve if it is of the flanged type; otherwise screw the safety valve into a screw flange of the proper size and place the latter on the gasket. By means of two or four finger clamps, as required, and the ⅞ in. studs, clamp down the safety valve onto the test table.

Using the long handle needle valve, admit air slowly into the safety valve and watch the hand on the pressure gauge selected for this test (the hand on a pressure gauge should seldom, if ever, be made to move past the half-way mark on the dail) until the safety valve opens, and note the pressure. If it is a relief valve being tested, the air will make a slight hissing noise as it leaks past the disc. If it is a pop valve it will open with a loud pop. If the safety valve opens at the specified pressure, the cap should be removed from over the adjusting screw and the position of the latter marked with a sharp-pointed center punch to facilitate reassembly.

If the operating temperatures are above 250 F, set the valve about 3 per cent higher and if above 1000 F set it 5 per cent higher, than the desired pressure to compensate for the action at the elevated temperatures.

The safety valve is then completely dismantled and the valve disc is ground against the seat, using a fine carborundum paste. During the dismantling process, care should be exercised not to disturb the setting of the blow-down ring on the pop valve. Then all the parts are again washed in the degreaser and the valve reassembled, using the above-mentioned center punch mark to indicate the proper position of the adjusting screw. This will save considerable time which otherwise would be used in experimentally setting the safety valve so as to open at the desired pressure.

[1] See April issue, Plant Engineering, page 54, for details of this testing bench.

Table I. Desirable leak-tight pressures for various safety valve opening pressures

Opening Pressures	Leak-tight Pressures
0 to 10 psi	Opening pressure minus 1 psi
10 to 25 psi	Opening pressure minus 2 psi
25 to 50 psi	Opening pressure minus 3 psi
50 to 100 psi	Opening pressure minus 5 psi
100 to 175 psi	Opening pressure minus 7 psi
175 to 250 psi	Opening pressure minus 10 psi
250 to 350 psi	Opening pressure minus 15 psi
350 to 500 psi	Opening pressure minus 20 psi
500 to 1000 psi	Opening pressure minus 25 psi
1000 to 2000 psi	Opening pressure minus 35 psi
2000 to 5000 psi	Opening pressure minus 100 psi

The valve is then placed on the test block again and the adjusting screw manipulated as required to cause it to open at exactly the specified pressure.

After releasing the pressure, it is again slowly raised to a few pounds below the "set" pressure and a leak test made. This is accomplished by the use of a long bristled varnish brush of appropriate width dipped into a bucket of thick soap solution and then drawn slowly across the valve outlet so as to leave a film cross the opening not unlike a soap bubble. If this bubble remains for a few seconds it indicates that the valve is tight. The desirable leak-tight pressures are given in Table I.

If a leak is evident, the valve is removed from the test plate and placed upside down in the vise. By means of a home-made fork-shaped piece of flat steel inserted through the valve inlet, rotate the valve disc a few degrees and move it back to its original position. Then leak-test the valve again. If the leak persists after two or three trials, it probably will be necessary to take the device apart and re-grind the valve disc against the disc seat. When it is found that the valve is leak-tight at the pressure indicated by the table, the test date should be recorded on the case-history card for this particular safety valve.

The cap over the adjusting screw is then sealed in position with a wire and lead seal to prevent tampering and the safety valve is returned to its position on the apparatus. The operator should witness the replacement of the device and be satisfied that he can safely raise the pressure in the vessel. If, in the rare instance, a valve is located under the safety valve, this should be sealed open in the presence of the operator.

Occasionally it may be found necessary or desirable to change the operating pressure, and as mentioned above this means changing the setting of the safety valve. Most safety valve springs will permit an adjustment of about 10 per cent either way. If the contemplated change in operating pressure exceeds this amount, a new spring must be installed. Of course, it is always safe to reduce the pressure, whereas the safety valve body may not be able to withstand an increased pressure, so this fact must be given serious consideration before changing to a heavier spring.

In changing the size of the spring, the chart, Fig. 3, will be found useful. As the diameter and the overall length of the spring are fixed by the design of the safety valve body, the change must be made in the diameter of the spring wire.

Whenever the setting of a safety valve is changed it is very important that the stamping, either on the nameplate or on the hex of the

(Continued on page 60)

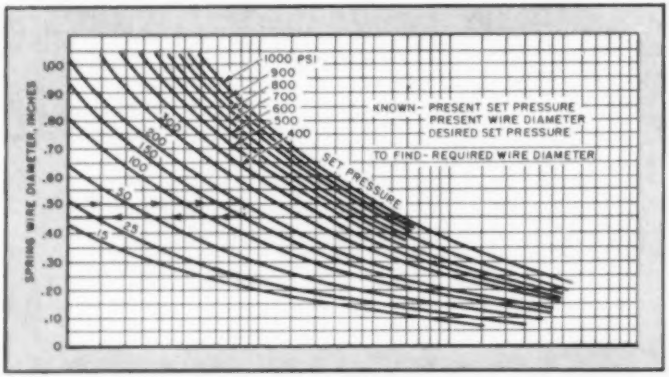


Fig. 3. When it is found advisable to change the spring in a safety valve the above chart may be consulted. Sample problem shows arrows passing from initial spring wire size to initial pressure down to new pressure back to new wire size

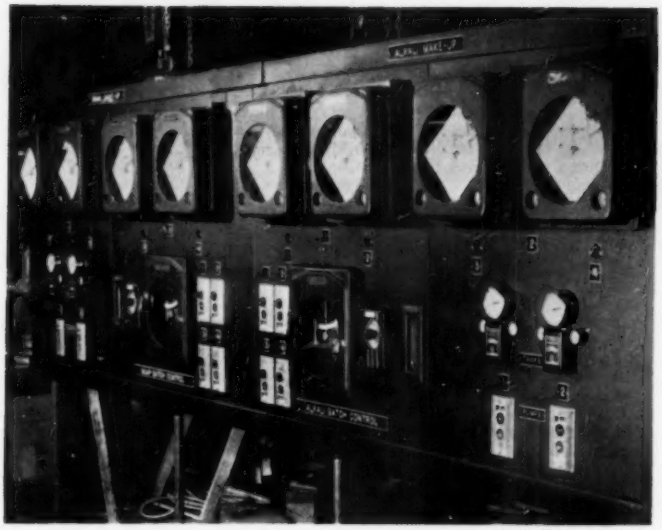


Photo: Fischer & Porter Co.

Fig. 1. Typical panel installation of rotameter flow recorders. Each rotameter is located in a pipeline near the process served and flow measurements are transmitted to the charts on this panel

The Rotameter
and Its Use in the Plant

Construction of the rotameter and principle of operation . . . Available for many conditions of flow and fluid . . . Consult manufacturer for recommendations on type . . . Materials and operation and maintenance

By ROBERT K. COLLIER, Mechanical Engineer

MOST PLANT ENGINEERS now have one or more rotameters in their plants. These units may be used for flow measurement and recording, viscosity measurement, level or flow control, and proportioning of fluid flow to various process units. Let's take a look at typical rotameters, see how they work, and how plant engineers can get the best results from a given installation.

Basically, a rotameter consists of a vertical, tapered, glass tube containing one or more floats which have diameters slightly less than that of the tube. Fluids to be measured flow through the tube and support the float at a height corresponding to the flow rate or the viscosity.

A graduated scale etched on the glass tube permits reading the flow rate or viscosity at any time desired. Or, if preferred, electromagnetic or other means may be used for transmitting the height of the float to any suitable recording or controlling instrument. Since the area through which the fluid can pass changes with the quantity flowing, due to the taper of the tube, rotameters are often called variable-area meters. The term "rotameter" is generic, covering all measuring instruments in which the indicating device floats in the fluid being measured. The term is not a trade name of any particular manufacturer. A typical installation is shown in Fig. 1.

Rotameter Types

As would be expected, the type of rotameter selected for a given industrial process depends on the fluid measured and flow conditions, steady or pulsating. Most fluids, such as liquids, vapors, and g ses, can be measured with rotameters. Air, fuel oil, gasoline, lube oils, steam, water, and acids are a few of the more common fluids measured by rotameters in industrial plants. The most common type of rotameter is that shown in Fig. 2A. There are a number of variations possible with this instrument; these include side inlet and outlet, bottom inlet and side outlet, dashpots for dampening flow pulsations, extension chambers for draining condensibles from vapors, use of several tubes to increase reading accuracy, batch control valve operators, orifice flanges for metering, and controlling and totalizing devices which are actuated by the float. However, regardless of type used, operating principles are the same.

In selecting rotameters it is common practice to supply the manufacturer with complete details of the fluid being handled and allow him to recommend the best unit for the job. At present, rotameter capacities are based on a 10:1 flow range from maximum to minimum. Maximum capacities are in the 6,000 gpm range and minimum capacities in the 0.5 cc per minute range. Standardized floats are preferred in industrial processing because they have a lower first cost and are easier to replace when damaged. Pressures up to 15,000 psi are allowable in certain types of rotameters. Viscosities ranging between 0.0008 and 800,000 centipoises can be measured, depending on the designed range of the instrument. Air flow rates between 85 and 12,500 cfm at standard conditions can be handled by units now available.

In selection and application of industrial plant rotameters, some knowledge of proper materials for the fluid handled is necessary. Table I summarizes materials used for rotameter parts when various common fluids are flowing. Although this tabulation is fairly complete, it should be used only as a general guide. Material specifications vary somewhat from one manufacturer to another and therefore it is necessary to use extreme care when ordering replacement parts. Glass tubes for most rotameters are made of borosilicate glass.

Table I. Recommended materials to give corrosion resistance to process rotameters

Fluid Measured	Fittings	Float	Packing
Air	brass	aluminum or stn. steel (303)	Neoprene
Crude oil	iron, steel	303 stn. steel	Neoprene
Freon	brass, steel	303 stn. steel aluminum	N.F.Neoprene
Fuel oil	iron, steel	303 stn. steel	Neoprene
Gasoline	iron, steel, brass	303 stn. steel Plasmet	Ameripol
Kerosene	iron, steel, bronze	303 stn. steel	Ameripol
Lube oils	brass	303 stn. steel	Neoprene
Naphtha	iron, steel, bronze	303 stn. steel	Ameripol
Steam*	iron, steel	303 stn. steel	Blue African Asbestos
Water (fresh)	brass	303 stn. steel	Neoprene
Water (sea)	bronze, Monel	bronze, Monel	Neoprene

*Bronze or stn. steel tube is generally used.

Operation and Maintenance

Give the plant engineer good instruments and production will be high in quality and of sufficient volume to meet output specifications. This is a theory held by all experienced designers of industrial plants. In all cases good instruments will aid production but they must be kept in topnotch working order by the plant engineer. No matter how well constructed and adjusted before it left the factory, there comes a time in the life of every instrument when it must be cleaned, repaired, or readjusted. Rotameters have been so widely applied to industrial processes that a knowledge of good operating and maintenance methods is necessary for low cost production.

In general, rotameters are best installed in a vertical position, Fig. 3. Connected piping should be properly aligned to prevent placing a strain on the instrument casing. By-pass piping around the rotameter is always advisable to permit continuation of production during periods of instrument repair. A check valve in the outlet pipe will prevent backing up of the fluid measured. If the check valve is not used a high back pressure may cause jamming of the float and breakage of the glass tube. When starting flow through the rotameter, the control valve is opened slowly to prevent slamming the float against the top of the tube. Flow at moderate rate is allowed until the float is steady, then the control valve is opened to the desired position.

Only a soft cloth, wet with carbon tetrachloride or acetone, should be used for cleaning the exterior and interior of the instrument. Special care should be exercised to prevent scratches and nicks on the glass tube or float; otherwise, instrument accuracy may be impaired. Floats and tubes should never be left in an exposed location on a bench or

(Turn to page 60)

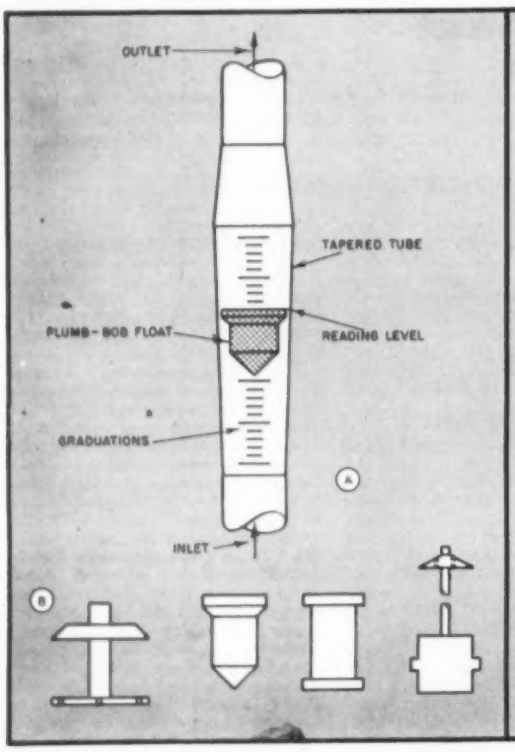


Fig. 2. A—Simplified diagram showing principal parts of a rotameter. B—Float shapes commonly used: bead-guided, plumb bob, self-balanced, and guided, depending on service

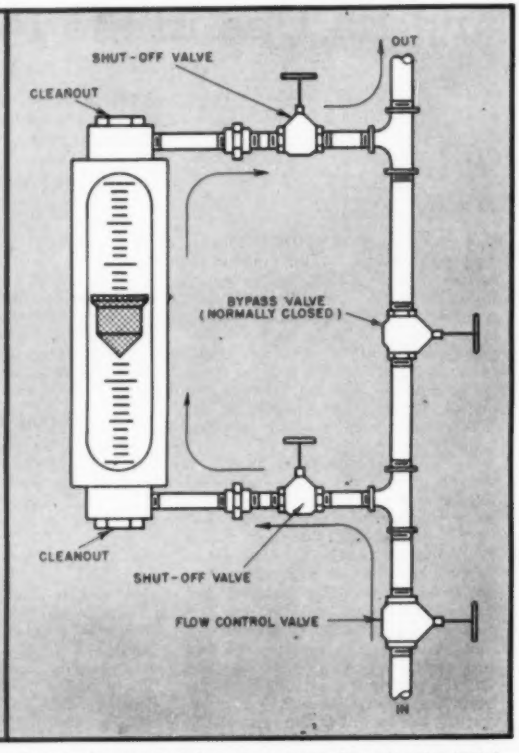


Fig. 3. Approved piping arrangement for rotameter installation. By-pass and vertical position of the meter assure accurate readings. All connected piping should be aligned

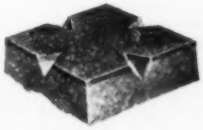
Blue Temper

FEREM FLOORS

Tough Floors for Tough Conditions

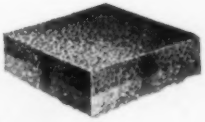
Cement

Notice the porous structure of the ordinary cement floor which is easily subject to crumbling by heavy traffic or shock loads as revealed by the carborundum wheel test.



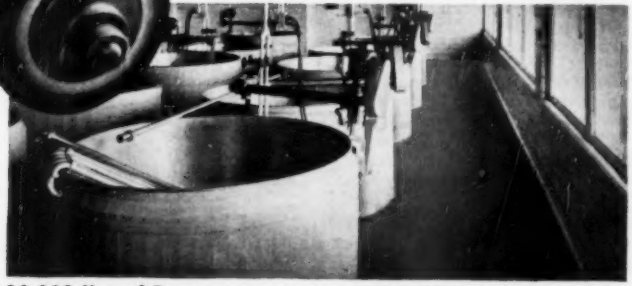
Metallic Hardener

In processed floors using metallic hardeners or metallic plating, the wearing surface is malleable but SLIPPERY and comparatively thin as the wheel test reveals.



Ferem "Blue Temper"

Ferem is the "Blue Temper" component. A dense, ductile and almost diamond hard floor surface results. NON-SLIP and highly wear resistant. The face of the test wheel polishes but does not cut.



20,000 lbs. of Ferem installed at the West Middleton Swiss Cheese Co.

A. C. HORN COMPANY, INC.

Manufacturers of materials for building maintenance and construction—established in 1897

10th Street & 44th Avenue, Long Island City 1, N. Y.

Los Angeles • San Francisco • Houston • Chicago • Toronto

SUBSIDIARY OF SUN CHEMICAL CORPORATION

HORN

PE

GENTLEMEN:

Please send complete data on FEREM FLOORS.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

Rotameters—

(From page 58)

table. These parts are fragile and readily damaged.

Instrument cleaning should always be done carefully and thoroughly. Pieces of lint, dirt or grease left on the tube or float may reduce instrument accuracy and affect plant production. Cleaning frequency depends on fluid handled, atmospheric conditions at instrument location, and general cleanliness of the plant. It is best to disassemble and reassemble only one rotameter at a time. This will prevent accidental switching of floats. Some floats are interchangeable but the accuracy obtained after changing is not always as good as with the original float. Packing screws should be tightened evenly, a little better than "hand tight" is quite sufficient.

Coal Handling—

(Continued from page 43)

Thawing has advantages. Sometimes this is done by thrusting tubes deeply into the mass and injecting live steam. An objection is that the condensate makes the coal wetter. Good reports have been received on the device shown in Fig. 6. A firebrick lined concrete box is located between ties adjacent to the track hopper. Heat from opposed gas or oil jets is reflected upward against the car hoppers. It is claimed that a deeply frozen load can be thawed in ½ hour with a fuel comsumption of 9 to 12 gal of oil or the equivalent in gas, at a cost of about $1.00 per car. When not in use the box is protected by a metal plate cover. The cost (1948) of the atomizing oil burners, control valves, oil filters, liner tiles and oil storage tank, is $450.00 or, adding the concrete box, piping and installation work, the total cost comes to about $1500.

Safety Valves—

(Continued from page 56)

valve, be changed accordingly. This may require obliteration of the old figures by filing or by peening.

But most important of all, when the safety valve is serviced for the first time, and also before serious consideration is given to raising the set pressure, a check-up must be made by an engineer or competent mechanic to assure that the pressure vessel and all the piping will withstand the higher pressure.

Where the safety valve is subject to excessive corrosion or gumming up due to the material in the system, it is good practice to install a suitable rupture disc in the pipe under the safety valve, to keep the material from entering the safety valve body. The rupture disc should be rated at or slightly below the set pressure of the safety valve. Should the pressure in the system exceed this amount, the disc or diaphragm will burst and allow the material to enter the safety valve which will then open and relieve the pressure.

The safety valve is without question the most important device, yet perhaps the least costly of any used in connection with a pressure system, but it may prove to be false security if not properly selected, installed and maintained and it may result in a loss of life and extensive property damage if it fails to perform as is expected.

Lighting Maintenance—

(Continued from page 37)

C. It is assumed that two men can replace 1000 lamps in four 8-hr days and it is further assumed that these men are paid $25 each per day, both conservative figures. The cost of replacing 1000 lamps on the budget reduction basis, then, is 4 X 2 X 25 or $200.

D. It is assumed that 5 per cent or 50 lamps, will fail prior to 5000 hr, and that they are replaced individually as in A. The labor of replacement, then, will be 50 X 0.75 or $37.50.

E. Since lamps will be replaced at 5000 instead of 7500 hr the added lamp cost, assuming a net cost of 70 cents for the standard 40 watt fluorescent lamp, will be

$$1000 \text{ X } \frac{7500 - 500}{7500} \text{ X } 0.70 \text{ or } \$233.10$$

F. Total cost of Budget Reduction Plan is 200 plus $37.50 plus $233.10 or $470.60.

G. The saving effected by the Budget Reduction Plan, then, is 750—470.60 or $279.40 per 1000 lamps, a very worthwhile saving which grows even more interesting if actual labor costs are less conservative than those used in this analysis.

Building Maintenance—

(Continued from page 47)

tables and skids would keep in line.

Maintenance of Floors

The upkeep cost of floors is about equal to the sum charged to roofs, walls, doors and windows, providing of course the buildings are normally used for manufacturing purposes and sweeping and other cleaning costs are included. We find most helpful a simple code system which provides analysis of the details which make up the total cost of building maintenance. The charges are broken down or divided between 17 major items which include roofs, walls, doors, windows, sewers, toilets, shower and wash rooms, ventilation, drinking water, heating systems, elevators, railroad tracks, pavements, fire protection, painting and floors. Repair costs of wood floors and cement floors are kept separate.

It is not difficult to determine when a floor needs repairs. Production workers, supervisors, truckers, safety engineers and pedestrians tell us of bad places or breaks in floor surfaces requiring immediate attention, and failure to act quickly sometimes results in an accident—an upset truck, spilled goods or broken bones. Here is where maintenance people face one of their toughest jobs. We cannot avoid emergency repairs whether on wood or cement floors. Several floor patching materials of admirable qualities both for ease of application and wear are used daily without interfering with regular production output or normal flow of traffic.

Due to the heavy costs of floor replacement, study should be made as to causes of floor deterioration. Hard surfaces such as concrete are acknowledged as smoothest and best from the viewpoint of hand trucking. By the same token, the hardness of this type of floor makes it more vulnerable to chipping and abrading. Trucks and other mobile equipment with iron or steel wheels or casters are hard on floors. Dropping of skid boards or racks, especially certain steel types, digs holes in the floor. Iron bars and other metal objects allowed to fall soon take their toll. Nonmetallic wheels or tires, principally rubber, are good insurance for long floor life regardless of the floor materials.

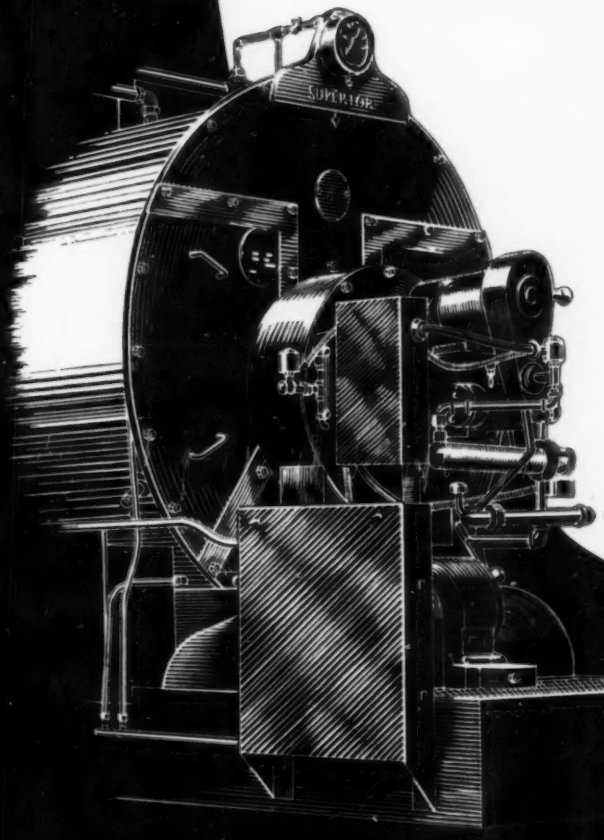
The largest percentage of flooring in our plant being concrete presents few problems other than sweeping. This is done at least once daily; the increases in schedules are due to manufacturing conditions. Wherever possible mechanical cleaning equipment is used. We also use dry scrubber and scarifying equipment to remove manufacturing waste built up on this type of flooring.

The other hard surface type of floors such as terrazzo and tiling is swept daily with wide dry cotton mops unless the areas are dirty or are filled with dense traffic. Then they are scrubbed with one of the various types of wet scrubbing machines most suitable for the condition and size job at hand. Very little hand scrubbing or mopping is done in our plant other than in toilet areas.

Many older buildings of slow burning construction and mill type buildings have wooden floors. In many cases the type of traffic has been easy on the floors and many have used an oily lay dust in sweeping until their floors carry a fairly high polish. The majority of our wooden floors fall in this category, being located in warehouse or light, clean manufacturing areas, thus re-

For STEAM DIVIDENDS Tomorrow

Buy SUPERIOR STEAM GENERATORS Today



The operating economies which result from Superior's higher efficiency and long-lived dependability pay *real* dividends to their owners. Their thermal efficiency (guaranteed to exceed 80%) insures lowest fuel costs. Their rugged, heavy-duty construction spells years of dependable, trouble-free operation.

Fuel and maintenance savings are outstanding where Superior Steam Generators have replaced older equipment . . . but the greatest dividends result where Superior Steam Generators are specified for new steam plants. For here are added to their economy of operation (1) the economy of small space, (2) the elimination of an expensive stack (for Superior's induced draft requires only a vent for the products of combustion), and (3) simplified installation resulting from Superior's complete factory assembly and wiring.

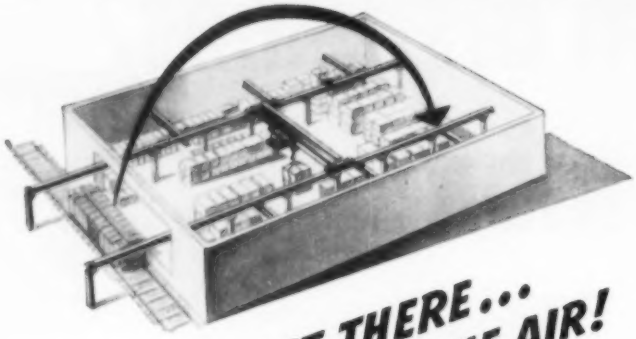
There'll never be a better time to buy a Superior Steam Generator . . . because these dividends start with the first day's operation, and every day thereafter adds its dividend.

17 sizes from 20 to 500 b.h.p. for pressures up to 250 p.s.i. Fully automatic with all grades of oil or gas. For complete data write for Catalog 205.

uperior ombustion ndustries, inc.

Factory Emmaus, Pa
Executive Offices Times Tower, Times Square, New York 18, N. Y.

FOR GREATEST ECONOMY OF SPACE AND MANPOWER



PUT IT THERE... THROUGH THE AIR!

A quick hook-on to a pallet, basket or standard sling and the load is whisked away—cutting across occupied floor space—straight to the spot where you want it.

It's smart, and thrifty to use "through the air" transportation as widely as you can in plants and warehouses. Compare this method for overall cost, efficiency, maintenance and safety before you allow other means of transfer to overlap the service that is best performed by cranes and hoists!

Let the Shepard Niles specialist break your problem down for you—he's experienced, skillful and he has the maximum number of sizes and types in his product line.

Shepard Niles

CRANE & HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads

474 SCHUYLER AVENUE • MONTOUR FALLS, N.Y

These wooden floor areas requiring special treatment due to abnormal surface dirt, tendency of wood to splinter or grind off due to traffic or type of operation they are subjected to, may be protected by giving them two or three coats of penetrating seal or finish, and then waxing. This type of finish produces a hand rubbed effect and is recommended because of the fact that the seal penetrates the surface and combines with the top fibers of the wood, thus producing a case hardening effect. The wax used in connection with this type of finish acts as a buffer which protects the surface and is readily replaced by merely damp mopping and waxing. It is seen that the maintenance of this finish is carried out by the use of wax and each subsequent application of wax will add to the appearance of the surface.

With this type of floor the future maintenance is simple requiring only sweeping, either with hair broom, cotton mop or polishing machine. Damaged floors or extremely dirty floors can be cleaned or rewaxed if desired. Any manufacturer of this type of seal and finish can give you the proper method of preparation and application to assure the best future results.

A type of flooring coming into demand and providing a new maintenance challenge to us all is asphalt, rubber and Koroseal floor tiling. Inasmuch as all three of these, in our judgment, require the same type of preparation and care we will handle them as a class, but bear in mind the resulting appearance is not only determined by maintenance care but by the basic flooring you are working with.

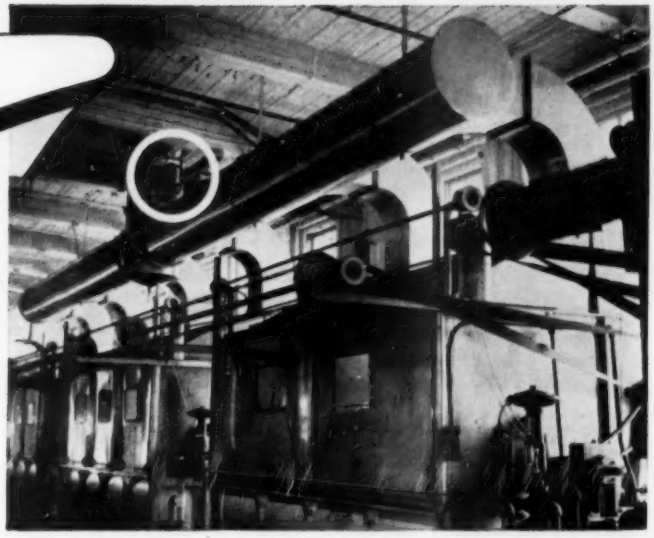
The recommended method of caring for these three types of floor tiling is with a no-buffing water emulsion type of wax, as this has proven to be the most practical, safe and economical. Rubber and Koroseal type flooring will require two coats but as asphalt tile is not a highly resilient type of floor we recommend carrying a heavy body of wax on the surface. Thus the original application should be made with three coats rather than two, a procedure which will increase the resilience and reduce slip hazard.

A recommended procedure for preparation of new and good condition floors is as follows: Floors should be scrubbed and thoroughly cleaned using an approved type cleaner, dilution depending upon condition of floor and type of dirt present. After scrubbing operation, rinse, using clean water, and allow to dry. Apply two or three coats of wax. If higher luster is desired, last coat may be polished when dry.

Future maintenance of floors as finished above may be handled as follows: Surface dirt or scuff marks can be removed with stiff brush, dry mop, or polishing machine. For

From the simplest installation

to the most complicated



HARTZELL FANS AND BLOWERS

move more air . . . cost less per year

Get a price from your nearby Hartzell representative on the fans and blowers you need. You'll find costs are reasonable. You'll discover two things more, too, following your purchase. One, that power cost per cubic foot of air moved is at the lowest possible level. Two, that maintenance costs remain at a low level year after year. Yes, initial cost is important, but ***be sure you get low annual cost,*** too. A fifty-dollar initial saving can be eaten up in one year of operation of one fan. Hartzell air-moving equipment is economical to buy ***and to operate***. Your Hartzell representative can prove it. If you don't know him, sign and mail the coupon at right.

Send Information_____
Name_____
Company_____
Street & No._____
City & State_____

HARTZELL PROPELLER FAN CO.
PIQUA DIV. OF CASTLE HILLS CORP. DEPT. C OHIO

PROPELLER-TYPE FANS AND BLOWERS—ROOF VENTILATORS—UNIT HEATERS • ENGINEERING OFFICES IN PRINCIPAL CITIES

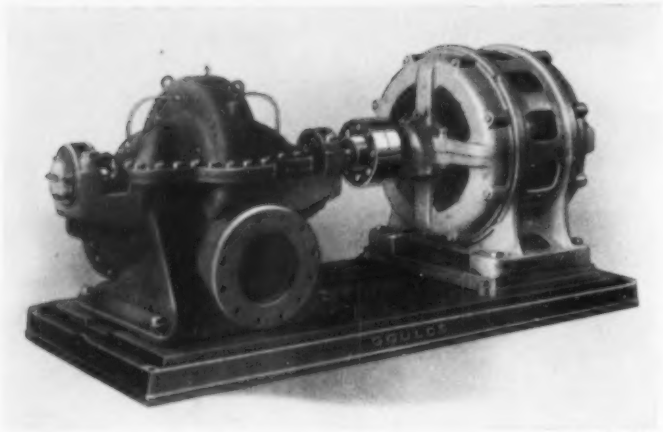


Fig. 3450

For heavy duty, large capacity jobs . . . Goulds double suction centrifugals

TYPE	USES	ADVANTAGES
Centrifugal, single stage double suction with horizontally split casing. Capacities: to 15,000 G.P.M. Heads: to 500 feet depending on capacity. Sizes: 2" to 16".	General water supply; water works; circulating and booster service; low pressure boiler feeding.	Rugged, heavy duty construction; may be dismantled without disturbing pipe connections. Made in bronze fitted, all iron, and all bronze constructions.

Other Examples of Goulds Complete Line

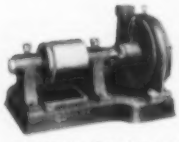


Fig. 3010—Cap. 5 to 100 G.P.M. Heads to 70 ft. Sizes 1", 1½", 2"

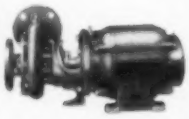


Fig. 3650—Cap. to 2000 G.P.M. Heads to 400 ft. Sizes1" to 6".

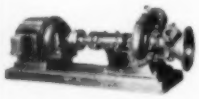


Fig. 3104—Cap. 250 to 4500 G.P.M. Heads to 220 ft. Sizes 4" to 8".

Fig. 3648—Cap. to 35 G.P.M. Pressures to 190 lbs. Sizes ½ H.P. to 5 H.P.

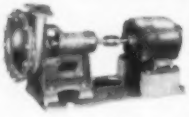


Fig. 3705—Stainless Steel —Cap. to 600 G.P.M. Heads to 200 ft. Sizes 1" to 3".

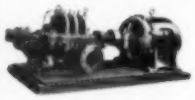


Fig. 3330—Cap. 40 to 2000 G.P.M. Heads to 3200 ft. Sizes 2" to 8".

Goulds Has The Right Pump For Your Job

The above are only six of the more than 180 types and sizes of pumps that Goulds makes. Pumps are our only business—have been for over 100 years.

The *right pump* for your job saves you money. Phone or write Pump Headquarters or your nearest Goulds representative for their recommendation on any pump job you may have.

MEMBER

Goulds PUMPS INC.
Seneca Falls
New York

rewaxing: If floor is not badly damaged, merely damp mop with clean water and apply one coat of wax. If floor is extremely dirty and worn, scrub and rinse, removing bad condition and when dry apply one or two coats of wax depending upon the amount of original wax removed.

Interval elapsing before the operation must be repeated will depend upon traffic, condition of floor and the job done. During the interim, the floors should be swept daily, preferably with a wide dry cotton mop.

The same rules and procedures as listed above for tiling of asphalt, rubber or Koroseal will apply to linoleum floors.

Following are a few practical hints that help cut upkeep costs. When your floor is finished with wax it has three great advantages over unwaxed floors: (1) It is lustrous, bright and much more attractive; (2) It is protected against wear—the wax takes the punishment; (3) It is smooth and dry—dust won't stick, thus it is easier to clean and keep clean. If you follow the few practical suggestions listed here you will keep floors in top condition at minimum expense.

Sweeping—Sweep floors daily with a hair broom or wide dry cotton mop to remove dirt and grit which might be ground into the finish if left too long. Do not use an oily mop which may leave a sticky film to catch dust.

Mopping—If the accumulation of dirt is so heavy that sweeping won't remove it, mop floor with a cotton mop dampened with cold water. Do not flood the floor or use a dripping mop.

Polishing—Use an electric floor polisher from time to time to polish heavy traffic areas and remove scuff marks. This will keep floors lustrous and help to blend touch-up spots in with the original wax film on the floor. The luster of the wax will be brightened by this polishing.

Touching Up—If floor is protected with traffic wax and you wish to remove any spots or stains, apply a little liquid traffic wax and buff. Use traffic wax to touch up spots where severe traffic has worn down the wax film.

Removing Old Wax—It is good practice to remove old wax entirely at intervals to prepare for a complete rewaxing. Frequency of removal of the wax film will vary from floor to floor depending on the amount of wear and the general appearance of the floor.

Re-Waxing—After removing old film apply an even coat of traffic wax or no-buffing wax. Traffic wax usually contains a mild cleaning agent; it cleans as it renews the wax finish. Do not use traffic wax on rubber or asphalt tile floors—always use a no-buffing type.

Fading, Bleeding, or Discoloring—Thoroughly clean with acetic acid

Now—One grease will service all grease applications in the majority of plants

Gives ALL THESE PLANT SAVINGS:

1. **Extends TIME between greasings**—lasts longer . . . stays in bearings longer.
2. **Low-cost application**—fewer servicings and *only the one grease* to handle.
3. **Simple inventory**—Shell Alvania Grease replaces up to 20 brands formerly required.
4. **Better protection**—against heat, cold and moisture.
5. **Greater safety**—less chance of applying the wrong grease!

Gives ALL THESE LUBRICATION ADVANTAGES:

1. **Higher mechanical stability** than any conventional grease at operating temperatures.
2. **Pumpable at low temperatures**—even in unheated storage.
3. **Stable at high temperatures**—superior to the best "soda" greases.
4. **Impervious to water**—excellent resistance to washing out.
5. **Longer service life**—reduced consumption.

The "MILLION-STROKE" Industrial Grease!

A grease that will stand 100,000 punishing strokes of the ASTM Work Tester has been considered a superior lubricant.

In a deliberate attempt to break down Shell Alvania Grease, *on the same tester* the run was extended...200,000 strokes...300,000 strokes . . . 500,000 strokes! Finally, at one million strokes the test was discontinued, because this grease *would not break down*—it was still a fit lubricant both in appearance and consistency.

SHELL OIL COMPANY

50 West 50 Street, New York 20, N. Y. • 100 Bush Street, San Francisco 6, California

SHELL®

SHELL ALVANIA . . . The "MILLION STROKE" Grease

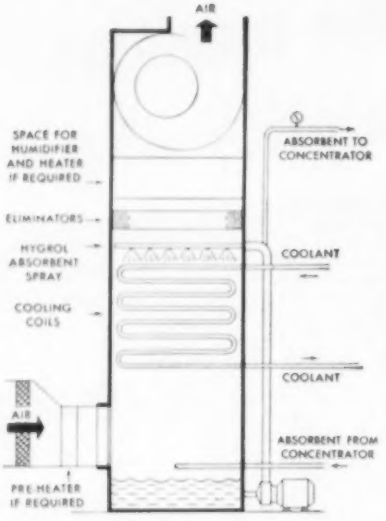
New Method Gives Precise Control in Air Conditioning

Niagara "Controlled Humidity Method" Uses Hygrol, Hygienic Liquid Absorbent

● The Niagara "Controlled Humidity Method" is a new system of air conditioning giving complete control of temperature and relative humidity, holding constant conditions or varying them at the will of the user. Especially, it provides dry air at normal atmospheric temperatures with little or no refrigeration required. A condition of 15 grains of moisture per pound of air at 85 deg. F. dry bulb temperature has been produced without refrigeration.

The apparatus is enclosed in a casing thru which the air is drawn by fans. The air is filtered and then enters a chamber where it is dehumidified in passing thru a spray of "Hygrol" Liquid (a hygienic hygroscopic chemical that absorbs the air-borne moisture and contains no salts or solids to precipitate). In the same chamber are located cooling coils which remove the latent heat of evaporation and also sensible heat as required.

The absorbent liquid spray falls into a tank at the base, where it is piped to a concentrator, removing moisture taken from the air. The re-concentrated liquid returns to the system. This process is continuous, and the apparatus operates at full capacity at all times.



NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

The same equipment may be used to provide winter air conditioning when required, by installing a tempering coil at the outdoor intake, an humidifier, and a reheat coil above the eliminators.

This equipment is manufactured in a range of sizes providing from 1000 to 20,000 CFM of conditioned air from a single unit, and mutiple unit installations are practical. It is expected that, by reducing the need for refrigeration, the cost of air conditioning will be reduced by this method. Applications generally are in a temperature range from 35 deg. F. upward. Below the freezing temperature of water, the Niagara "No-Frost" method is applicable.

The equipment is protected by U. S. and foreign patents. Installations have been made in food and chemical process industries, in packaging hygroscopic products, for preventing condensation of moisture on metals and other products in storage, in air conditioning for laboratory control and for human comfort.

For further information, write Niagara Blower Company, Dept. PE, 405 Lexington Ave., New York 17, N. Y.

cleaner (vinegar), diluted 1 part cleaner to 8 parts water. Rinse with clean water after cleaning operation. Rinse again, using 1 part acetic acid (vinegar) to the gallon of water. When dry, apply 2 or 3 coats of wax.

"Dont's" Will Help

Here are a few "Don'ts" if you wish to help your maintenance work: 1. Don't apply wax in a heavy coat. A thin, even coat does the best job. 2. Don't use an oily sweeping compound or mop. Wax is smooth and dry, while oil leaves a sticky finish. The use of oil defeats the purpose of wax finish. 3. Don't polish either traffic or no-buff waxes until thoroughly dry (20 to 30 min. after applying in most cases). 4. Don't let the wax film wear through in heavy traffic spots. Touch up these spots before the wax is worn away to protect your flooring investment. 5. Don't allow wax to "pile up" in light traffic areas around the edges of the room and under furniture. Remove these accumulations when they occur with an approved and tested floor cleaner. Then rewax. 6. Don't use strong highly alkaline cleaners or powders on your floors. 7. Don't use traffic wax or paste wax on rubber or asphalt tile.

Advantages of Premixing

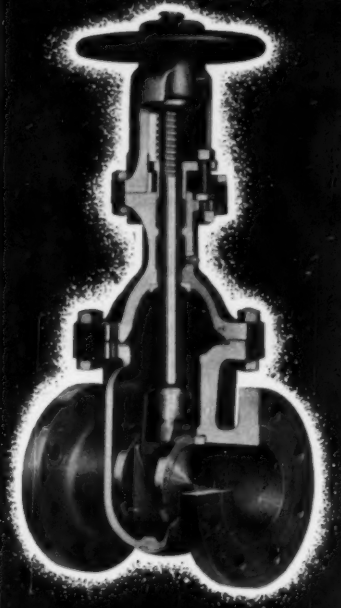
There is one subject, premixing, mentioned previously, which applies to all cleaning yet little thought is given to it. Premix is not a meaningless term; premix is a tool of practical working value, essential to a high standard, efficiently administered maintenance operation.

Three prime benefits accrue through premixing—economy, attainment of job standards, and insurance. Economy can be effected because strategic placement of premixed cleaning solutions saves time in mixing, handling and transporting of the base liquid cleaner to the area to be cleaned. This practice saves many hours of labor because of unproductive time expended in frequent or daily mixing and carting of cleaning solutions. A large quantity can be mixed in the same time that a small quantity can be premixed.

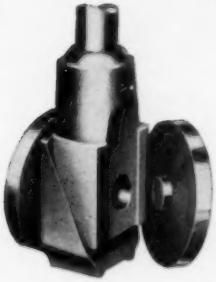
Premixing guarantees proper strength of cleaning solutions thereby assuring consistent ease of cleaning for the specific condition. Certain floor areas or types of floors can be classified, maximum and minimum dilutions determined and mixed, and certain persons assigned to maintain the respective type of floor. This develops a routine procedure for every type of floor to be maintained. The person assigned to a certain class of floor becomes a specialist. Time is saved by this practice through premix.

Training of personnel is simplified because the responsibility for premixing is vested in supervision. Large corporations can readily shift and transfer personnel without a

How Darling features prevent trouble and expense



UNIFORM WEAR DISTRIBUTION



A LARGE percentage of valve leaks, lost time, expense, can be blamed on uneven wear—the uneven wear caused by repeatedly exposing the same disc and seat areas to concentrated pressure, fluid flow, and resultant galling from operation.

For years such leaks were considered the result of normal, expected wear. But the unique design of Darling Double Disc Parallel Seat Gate Valves has proved that uneven wear can be prevented. The two valve discs shown in the cutaway view, and again in the removed inside assembly, are separately and independently hung and free to revolve through their 360°. Valve operation aids the action during the lowering and raising of the disc assembly. The discs never seat twice in the same position and obviously wear is bound to be uniform. This results in tight closure even when the disc faces are worn.

Hundreds of Darling gate valve users have learned by experience that uniform wear distribution results in longer service life and correspondingly lower maintenance cost.

DARLING VALVE & MANUFACTURING CO.

Williamsport 14, Pa.

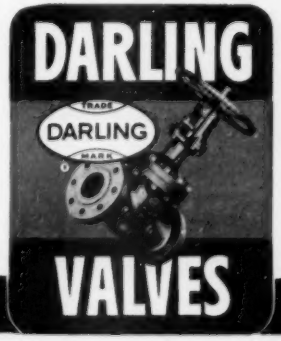
"This advertisement is one of a series showing how the unique Darling Fully Revolving Double Disc Parallel Seat Gate Valves answer the following critical operating problems:

- Positive, easy closing—regardless.
- Automatic adjustment for valve body distortion.
- Elimination of disc-to-seat friction and galling.
- Uniform wear distribution.
- Extreme simplicity.
- Greater service life.
- Simplified maintenance.

CORROSION RESISTANT VALVES

In addition to conventional iron, bronze and steel constructions, Darling specializes in valves for any corrosive fluid: iron body valves with special alloy trim; iron body, rubber lined, with special alloy trim; all bronze; and all special alloy. Darling's 50 years of experience in meeting unusual requirements is always at your service.

Outline your service requirements and get complete *information on Darling Valves of the proper type. Or, send for the complete 300-page Darling Catalog No. 17M. It describes Darling Valves of* all *types for* every *normal or unusual service, and for pressures up to 1500 pounds. It's full of helpful information . . . Yours for the asking.*



THE VALVE MARK OF QUALITY . . . WATCH FOR IT

FULLERGRIPT PROVES ITS WORTH ON HARRIS OFFSET PRESSES

The 42" x 58" two-color Harris Offset Press, made by the Harris-Seybold Company of Cleveland, employs a series of short brush strips with wedge-shaped trim. These are called wrinkle brushes. They are used on the impression cylinder for a two-fold purpose: (1) to keep the paper lying flat against the cylinder and (2) to remove any foreign matter from the paper.

Harris engineers saw that with Fullergript it is possible to position the brush close to the meeting point of the two cylinders. The small size of Fullergript makes it much easier to assemble in tight places, at the same time providing maximum effectiveness in performing its dual functions.

Fullergript brush strips are made in a variety of shapes and sizes. Maybe there's an unusual application in your plant where Fullergript can help you. Why not get more information by writing today to . . .

DO YOU REQUIRE A SPECIAL MACHINE FOR A BRUSHING OPERATION? You can benefit from our wide experience in designing and building special brushing machines. No obligation to lay your problem before our engineers. Write today.

FULLERGRIPT The FULLER BRUSH CO.

INDUSTRIAL DIVISION, 3637 MAIN ST., HARTFORD 2, CONN.

refresher or training period. Frequent drawing of supplies from the main store room is eliminated.

The second benefit, attainment of job standards, as outlined in our plant by the use of standard operating procedures, is possible through premix. Uniformity of job performance to predetermined standards is possible to a greater degree with premix. Inspection control by supervision is facilitated and trouble spots or heavily trafficked areas are more effectively attended to. Uniformity of expected results can be more easily judged.

Insurance, the third major benefit, is available by employing premix. Prevention of damage to finish surfaces is assured. Determination of noninjurious dilutions is developed by pretesting on specific floors. Possibility of damage to floors by injurious, corrosive action of the cleaner is eliminated, thereby lengthening the service life and beautifying the appearance of the floor.

Floor cleaning with a premixed solution, then, can do this for you in other phases of your maintenance and sanitation department: Material can be conserved, stock inventories reduced, theft of base cleaner concentrates is eliminated, a self-policing stock control is established, training and evaluation of personnel is simplified and expedited, job assignments can be classified and grouped, it lends itself to a more clearly defined standard operating procedure, actual cleaning is easier, insurance is provided against damaged surfaces, supervision and inspection control is simplified, attainment of high standard of maintenance is assured, and finally, economy and cost control are the increments gained.

Test Panel Inspects Wire Harnesses

Contributed by Fairchild Aircraft Div.

A NEW AUTOMATIC wire harness test panel has been developed by our company for the inspection of aircraft electric, radio and electronic wire groups.

The machine consists of a motor-driven 30 position switch and necessary lights, relays and control switches, which allow all electric wire harnesses to be checked for both continuity and short circuits in a matter of seconds.

The panel is made obsolescent-proof by means of boxes which can convert the machine to the electrical needs of any airplane. The wiring systems of different model airplanes may be checked concurrently merely by the manufacture of new adapter boxes or quick change modification of old ones.

In a typical operation, the proper adapter box is placed in the machine

Developed by three years of research . . . and now refined by tens of millions of dollars' worth of new equipment!

Gulf's GREAT NEW No-Nox

DESIGNED FOR TODAY'S POWERFUL NEW ENGINES!

Today's new cars have the most powerful *engines* ever made. AND—

They require a super, anti-knock gasoline.

Such a gasoline is the *new* No-Nox. It was especially designed by Gulf scientists—working hand-in-hand with leading automotive engineers—to give you *maximum* performance in your new car.

With a gasoline like this great new No-Nox, you can be *sure* your new car will perform at its brilliant best.

And the new No-Nox not only gives *new* cars peak performance. It also gives new life, new pep, and stops knocks in older cars too — even many with heavily carboned engines!

So no matter what model you drive, get a tankful of the *new* No-Nox today.

See for *yourself* what a difference it makes!

Whisper-Quiet, Knock-Free Power!
Easy, Fast-Firing Starts!
Quick, Safe Passing!
Unexcelled Mileage!

Terrific Power in Every Drop!

Good Gulf—our famous "regular" gasoline —is now better than ever, too!

Gulf Oil Corporation • Gulf Refining Company

NEW DEMING MOTOR MOUNT PUMPS

Deming Type "H" Horizontal MOTOR-MOUNT Centrifugal Pump.

Deming Type "V" Vertical MOTOR-MOUNT Centrifugal Pump.

Compact! POWERFUL!

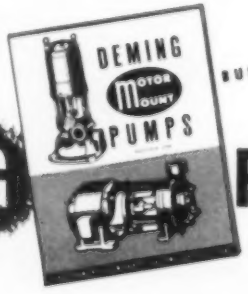
An entirely NEW line of Deming MOTOR-MOUNT Centrifugal Pumps covers a wide variety of applications. Available in 50 standard units (25 Type "V" Vertical units and 25 Type "H" Horizontal units.)

Wide Range of Capacities

Capacities offer wide selectivity, ranging up to 200 g.p.m. Heads up to 165 ft. Motors 1/4 H.P. to 7 1/2 H.P. Speeds 1750 3500 r.p.m. Maximum total pressure 125 lbs. Maximum suction pressure 50 lbs. Maximum recommended liquid temperature 200° F.

Construction features, performance charts, metal specifications for standard fitted, all bronze, and all iron units included in new BULLETIN No. 4350. Send for your copy and check the features of these new Deming MOTOR-MOUNT pumps.

THE DEMING COMPANY
532 BROADWAY, SALEM, OHIO



BULLETIN No. 4350

DEMING PUMPS

and the wire harness to be tested is plugged into the box. A switch is thrown for continuity check and a light pattern is set up on a panel in front of the inspector in approximately six seconds. When the machine stops, the pattern of error, if any, remains indicated on the board by the panel of test lights. If error is indicated, this is noted on a harness tag and the system is scheduled for rework. If test is satisfactory, a reset button is pushed and the board is cleared for a check.

In checking for short circuits, the machine goes through another six-second cycle. During this check, no lights are shown on the board unless trouble is indicated. If the machine shows a short in the group of wires being tested, this is also noted on a tag and the pattern is cleared for another inspection.

Hotel Built from Top—Down

HERE'S A new twist in building construction. To the amazement of the building industry, the roof was the first thing that went on the steel and concrete framework.

After the roof, the men started

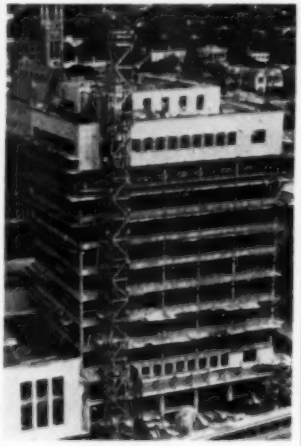


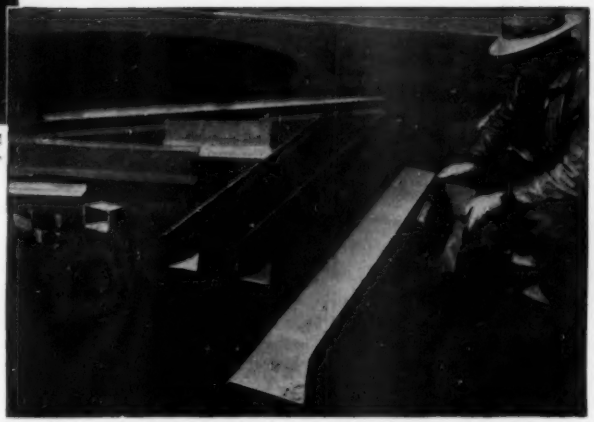
Photo: Owens-Corning Fiberglas Corp.

Hotel being constructed from the roof down. Once the roof insulation was laid down on the steel and concrete framework, walls were bricked in from the 13th floor down and finishing work began at once

bricking in the walls—from the roof down. In this way, the plasterers, trim-work laborers and last-stage carpenters were working on the inside finish of floor 13 while the bricklayers were still putting in the walls of floor 12. With the roof on, there was no need to traffic the finishing work behind the bricklayers working the conventional up methods. This particular approach cut three months off the construction schedule.

Your ROOF doesn't have to be Overhead!

Monel parapet flashing, siding, skylight trim and gutters. Installed on a coal-burning power plant in 1913, they are still in good condition.



These Monel gutters, base, cap and step flashings, down spout straps and eave boxes were installed on a chemical manufacturing plant, where they are successfully resisting destructive fumes, smoke and lowland dampness.

Now, with the new economical Monel Roofing Sheet, it is often cheaper to install a new Monel roof than to keep paying repairs for a leaky roof.

Tired of short-lived roofs and roofing parts?

Then turn to the metal that can end your problem . . . *Monel**.

Monel is an alloy consisting of approximately $\frac{2}{3}$ nickel and $\frac{1}{3}$ copper. Throughout industry it is known for its resistance to corrosion and rusting . . . severe stresses . . . wear . . . buckling and cracking at extreme temperatures.

It is doing hundreds of different jobs (*tough jobs*) in many fields, in many forms.

To you it offers a chance to cut your annual outlay for roof maintenance. Just look at the record. Monel roofing installations date back to 1910. Most of them have never required a penny for subsequent repairs.

No wonder Monel roofing is called "life-of-the-building" roofing.

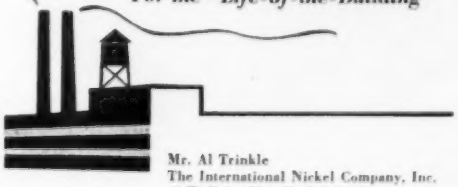
Investigate Monel roofing for your own plant buildings. At a practical cost, you can have an entire roof of Monel, or Monel roofing parts such as drainage systems . . . flashings . . . skylight frames . . . ventilators . . . louvers . . . ducts . . . siding . . . expansion joints . . . copings . . . canopies . . . terrace sheathing.

Send for our booklet, "ONE METAL ROOF"

It shows typical installations, tells about Monel's many advantages, cites long service records. Included in the booklet is a sample of Monel roofing sheet.

MONEL ROOFING

For the "Life-of-the-Building"



EMBLEM OF SERVICE

INCO TRADE MARK

Mr. Al Trinkle
The International Nickel Company, Inc.
67 Wall St., New York 5, N. Y.

Please send me a copy of "ONE METAL ROOF" and the sample of Monel Roofing Sheet.

Name.....

Title.....

Company.....

Address..... PE-6-50

City..... State.....

THE INTERNATIONAL NICKEL COMPANY, INC.

*Reg. U. S. Pat. Off.

67 Wall Street, New York 5, N. Y.

STANDARDAIRE

Precision Built Axial Flow

BLOWERS handle the movement of air gently by screw action instead of paddle action, as is the case with other positive displacement blowers. Result — air pulsations and noise are reduced to a surprisingly low level. In Standardaire Blowers the revolutionary new form of the rotors marks a major improvement in blower design. The rotors are produced by an exclusive rotary generating process, the form and helix being controlled entirely by the machine gears. This produces rotor threads that are accurately shaped and machined to close tolerances for efficient blower operation. The design of the rotors and other construction details makes possible internal compression to a degree that Standardaire Blowers operate on a modified adiabatic cycle with a lower mean internal pressure. This important feature, together with advanced engineering throughout, makes for a quiet, compact, efficient blower with long service life.

Write for Standardaire Blower Bulletin covering dimensional information. Publication No. 88.

The Standard Stoker Company, Inc.,
Dept. C-12, 370 Lexington Ave.
New York 17, New York

Standardaire Blower equipped with unique pulley attachment for belt drive, when required.

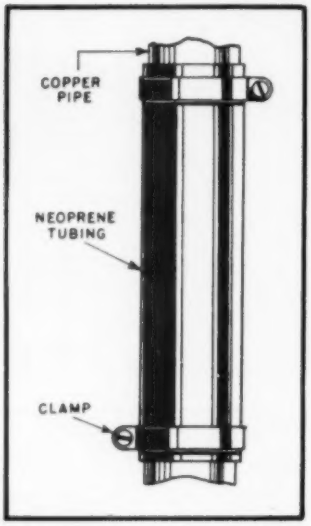
THE STANDARD STOKER CO • INC •

Standard Stoker

NEW YORK • CHICAGO • ERIE • MONTREAL

Vibration Eliminator Substitute

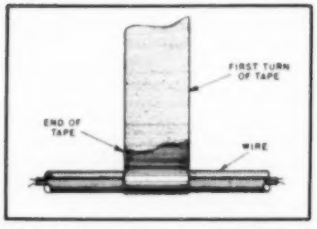
IN AN INSTALLATION of more than a dozen medium size Freon 12 refrigeration compressors serving food storage boxes in a hotel, trouble was encountered due to breakage of some of the vibration eliminators used to connect the suction lines to the rubber-suspended, hermetically-sealed compressors. This resulted in substantial losses of refrigerant gas as well as failure of refrigeration.



Neoprene tubing does a good job here

To eliminate this condition, a suitable length of neoprene tubing was substituted for each of the damaged eliminators. This tubing was heavy-walled and was attached to the copper piping with screw type hose clamps, refrigeration gasket cement being applied to the connections. These substitute connections are giving perfect service.

Applying Tape



Where it is necessary to apply friction tape, or any other type of gummed tape, to wires in confined locations and only one hand can be used, the tape should first be anchored to itself, as shown, by taking one turn around the wire and pressing the end of the tape against the first turn. This will serve to prevent the first turn from loosening on the wire, and producing a poor job

Copper Tube Pipelines

offer these three basic advantages

1. **FLEXIBILITY,** in installation and in operation. Bends and offsets to clear beams and girders are readily made in copper tubes; soldered connections can be made in spaces too restricted to manipulate a wrench. Once installed, copper tubes connected with solder fittings can be taken down, moved, or have new connections cut in faster and with less expense than with threaded pipe.

2. **MODERATE COST,** for material and for labor. Solder-type fittings eliminate threading, reduce tube weight, require minimum time for layout and installation.

3. **SUPERIOR PERFORMANCE.** Solder fittings give uniformity of bore to copper tube piping; flow is unimpeded at joints, and the rust-free surface of copper means a low coefficient of friction, with reduced pumping costs. The corrosion resistance of copper provides assurance against premature pipe replacement and excessive maintenance cost.

ANACONDA

Anaconda

COPPER TUBES

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 20, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD.
New Toronto, Ont.

ANACONDA Copper Tubes in standard sizes are manufactured to A.S.T.M. and Federal Specifications. Types K and L are furnished soft in long coils; also hard and soft in 20-ft. lengths from $\frac{3}{8}$" to 12" in diameter. Type M tube is furnished hard only in 20-ft. lengths from $1\frac{1}{4}$" to 12" in diameter for waste, drainage and vent lines. Larger sizes, up to 26" I.D., can be made to order.

Write for Publication C-24 on ANACONDA Copper Tubes and Fittings.

4780 Rev.

New Products and Methods

1—MOTOR CONTROL UNITS

Full- or reduced voltage, are supplied ready for installation

Slipsyn Synchronous Motor Control Units for operating and protecting all types of synchronous motor drives, are factory-wired, requiring only external connections when installed. Company's ASR polarized slip-frequency relay with associated control provides automatic synchronization with maximum pull-in torque at proper speed and phase relation, company states, to minimize line disturbance. Pull-out protection is incorporated to stop motor automatically if it pulls out of step. Provision for re-synchronization after pull-out can be made if load conditions permit.

A thermal protective relay is used to guard stator against sustained overloads; another to guard rotor damper windings against failure of motor to start. Time delay under-voltage protection can be supplied. With company's Type BAL fuses (optional) units have interrupting capacities up to 250,000 kva, 4600 v, three phase, 60 cycles. Westinghouse Electric Corp.

2—SWIVEL PIPE COUPLING

For conveying fluids under high pressure through rotating pipe

The All-Flex Ball Bearing Swivel Pipe Coupling has rotating members held tightly together with two sets of ball bearings operating in flame-hardened and ground ball races. Coupling is intended for average speed of rotation not to exceed 60 rpm. Its metal backed packer assembly is said to make the unit pressure tight, sealing all pressures from vacuum to 12,000 psi, full pressure range being covered without manual adjustment of packing.

Couplings are made of steel and available in a wide range of sizes and for working temperatures up to 225 F. Gil-Lair Products, Inc.

3—HOT LINE CLAMP

For copper, copperweld conductors; is strong, light in weight

An outstanding feature of the 408C Hot Line Clamp is the wider range of wires it accommodates—4/0 strand to 6 solid line wire, and 3 No. 6 to 8 solid tap. Clamp is cold forged copper. Eye screw, tap screw and pressure bar are silicon

bronze. Top wire connector is a seamless copper extrusion. Clamp's design is said to provide components which align perfectly for drilling and tapping. Clamp can be supplied for use on steel, aluminum over steel, and copper. Reliable Electric Co.

4—ELECTRIC HOIST

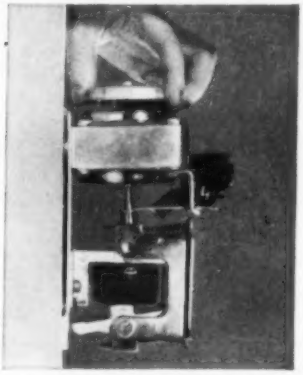
Has adjustable trolleys for both single or double wheel tracks

The Multi-Purpose Power Hoist is described as an economically priced electric unit designed to lift 500 lb at 25 fpm or 250 lb at 50 fpm. It is intended to lift or pull distances up to 200 ft, and is adaptable as a power unit at 62 rpm for running grindstones and any other drive application suitable to its speed and power rating. Hoist has a $\frac{1}{4}$ hp, single-phase reversing motor, cable for 10 and 20 ft lifts, grooved drum, automatic brake and conventional hook attachments. The Flinchbaugh Co.

5—PNEUMATIC RELAYS

Are designed to permit time delay adjustment from 0.2 to 200 sec

The Type AM Pneumatic Time Delay Relays have a large graduated dial to permit delay adjustment throughout their 0.2 to 200 sec range for general timing functions. Micro-movement-type precision snap



switches with double "make" and "break" contacts (rated at 15 amp, 115 v continuous duty) are used. Switches for interlocking can be supplied.

Relays are available as open or enclosed units, the latter in NEMA Type 1 enclosures with conduit knockouts at top and bottom. Operating coils are designed for

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 19-20 and 89-90.

Use this team for effective low cost ventilation—

AIRMOVER **Roof Ventilator**

AIRLOUVER **Intake Louvers**

Beat the cost of power and expensive duct work whenever *Natural* (gravity) ventilation will do the job. With a combination of Swartwout large capacity AIRMOVER and adaptable weatherproof AIRLOUVERS you have a highly efficient system—one that moves enormous quantities of heat or contaminated air—at lowest cost per square foot of opening. Write for information on these and other Swartwout Ventilator designs.

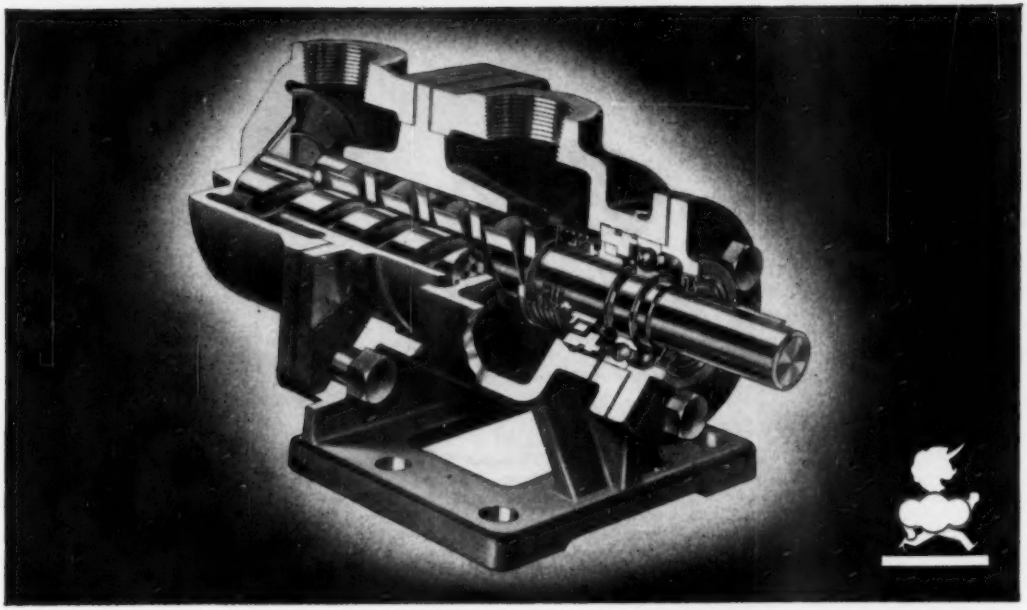
18511 Euclid Avenue, Cleveland 12, Ohio

The Swartwout Co.

Industrial Ventilation Specialists Since 1904

Equipment for *Controlled* Air Circulation

A NEW IMO PUMP
AT LOWER COST THAN EVER BEFORE!



ONLY AN IMO GIVES YOU THESE ADVANTAGES

RELIABILITY — only three moving parts — no gears, vanes, pistons. Nothing to get out of order or adjust. The mechanical packing seals never require attention.

QUIETNESS — no noise, no vibration.

FREEDOM FROM PULSATION — continuous, axial flow.

HIGH SPEED OPERATION — for direct connection to motors, turbines, and machines. Also can be driven by belt or chain.

LOWER COST THAN EVER BEFORE

The new IMO A313A possesses all the unique advantages of the IMO pumping principle — it is built to the highest quality standards but it is designed especially to permit low cost, standardized quantity production.

The IMO A313A can be used for delivering up to 80 gpm against pressures to 150 psi, as required for lubrication service, oil transfer, low pressure, hydraulic systems, and general pumping of oil and viscous fluids.

Send for Catalog—1-159-PE

DE LAVAL

IMO-DE LAVAL PRODUCTS DIVISION

DE LAVAL STEAM TURBINE CO. • TRENTON 2, N. J.

1-159

THEY* "BOOTED OUT" SALAMANDERS

THEY INSTALLED DRAVO HEATERS

THEY SAVED

$4,372.00 PER YEAR

*Rosedale Foundry and Machine Company, Pittsburgh, Pa.

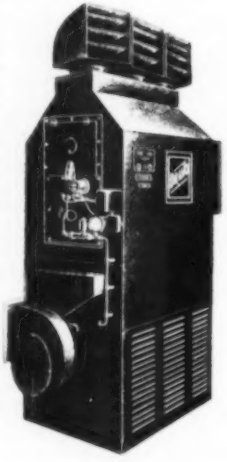
Like many other metalworking plants, Rosedale, producers of Meehanite Metal castings, depended for years on salamanders for heating. Everyone *assumed* that any more modern method would cost too much, and probably couldn't heat the high-roofed, metal structure much better anyway.

But no one was happy about the situation. Coke and labor were big cost items. Production was lost while men "thawed out". Air was smoky and sulphurous.

So Rosedale investigated, and found (1) that Dravo *Counterflo* Heaters could do the job for LESS cost than salamanders, (2) that Dravo was already heating many similar structures with complete satisfaction, and (3) that Dravo Heaters would help clear up the polluted atmosphere.

Result: four Dravo *Counterflo* Heaters were installed, eliminating 39 salamanders. Yearly cost-reduction is $4372. Even with 25% annual amortization, this company is currently saving $500 a year. After four years the investment will be completely written off, and the entire saving will be velvet. The indirect savings—improved production, greater employee comfort, elimination of coke fumes, and saving in floor space—are extra dividends. Everybody's happy about the heating now.

No one can afford, today, to put up with old-fashioned, inadequate heating equipment—any more than to use old-fashioned production machines. Let us review your heating problems, and provide you with some specific examples of the savings Dravo *Counterflo* Heaters are making for others—and that they can make for you. Consult your classified telephone directory for the name of the local representative—or write us direct.



DRAVO
CORPORATION
DRAVO BUILDING, PITTSBURGH 22, PA.

DRAVO

Sales Representatives in Principal Cities

Mfd. and Sold in Canada by Marine Industries, Ltd., Sorel, Quebec

service down to 85 per cent of rated voltage. Coils come in ratings up to 600 v a-c, 25 to 60 cycles. Westinghouse Electric Corp.

6—TANK MAGNET

For recovery of ferrous parts, removal of contamination

Made of stainless steel and described as temperature-proof, acid-proof and alkali-proof, this magnet is for removing ferrous material from electroplating tanks, acid and alkali baths. It works like a carpet sweeper, with magnetic tube mounted between neoprene wheels. Ferrous material spreads itself over the entire circumference to a thickness of about $^{3}/_{4}$ in., company explains, and unloading is done by pushing the upper ring from one end of the tube to the other, where a non-magnetic section allows release of the load.

Overall length of this lightweight unit is 48 in. and it comes in $16^{1}/_{4}$ and $21^{1}/_{8}$ in. widths. Smaller size costs $35.50, larger size $41.50. Eriez Mfg. Co.

7—CONE TYPE PACKING

Made of Teflon, for use where free spindle operation is needed

Chemiseal 810C is a cone-type packing for use in stuffing boxes where application demands resistance to chemical attack and where packing must allow a freely operating spindle. It is formed of Teflon, described as chemically inert and non-contaminating and able to withstand temperatures from —150 F to 550 F. According

to company, the natural slipperiness of Teflon makes it ideal for packing purposes, and it will not "freeze" a valve. Packing is supplied as series of cone-shaped rings, and because of this design the sealing action of the packing is derived partly from flexing of the cones. It is explained that since less pressure is needed to cause flexing, even low gland pressure exerts a flattening action. Chemiseal 810C is available with adaptors for square-shaped or chamfered-end stuffing boxes. If necessary, cone-shaped rings may be split for installation. United States Gasket Co.

8—MAGNETIC FLUID CLUTCH

Still in laboratory stage, it promises increased load carrying

A liquid which can instantly change to a solid and then return to a liquid again is the basic feature of this magnetic-fluid clutch. Only 6 in. long and 6 in. in dia, the device is capable of carrying enough power to lift a ton 1000 fpm, company engineers report, emphasizing that it is still in the laboratory stage and its commercial possibilities not yet explored.

The clutch consists of two metal cylinders, each able to rotate independently on the same axis. Company explains that cylinders are separated by a magnetic mixture of oil and finely divided iron powder. When unit is energized, the fluid solidifies, making a rigid connection between cylinders, so as one revolves, its motion is transmitted to the other. Power can be applied to load and removed from it by clutch operator. Degrees of rigidity of fluid can be obtained by regulating current so clutch can be allowed to slip, if necessary.

Working with the same basic type of clutch developed by the National Bureau of Standards, company engineers equipped this model with rectangular teeth on the surfaces of its clutch faces to permit carrying heavier loads. General Electric Co.

9—WAX SPRAY OUTFIT

Is designed for spraying any of the liquid auto waxes

Correct atomization of liquid wax is described as an outstanding feature of the S-555 Wax Spray Outfit, and this is credited to the incorporation of the company's Model SE Spray gun. This gun is said to give an exceptionally fine, uniform

*COLOR

For maximum production . . . top efficiency . . . lowest operating cost, give your machines the finest in lubricants—give them Tycol oils and greases.

Tycol lubricants are made to meet every lubrication need of industry—from roll neck greases for steel mills to spindle oils for textile plants.

Each Tycol lubricant is subjected to rigid tests during manufacture. This control assures the required lubrication characteristics—*COLOR, penetration, viscosity, to name a few—for maximum performance of that particular product. At every step from selection of crudes to blending of the finished product, Tycol lubricants provide maximum lubricating efficiency which means greater economy, longer life for every type of equipment.

Tide Water Associated will be glad to assist you in selecting the Tycol lubricant best suited to your specific need. Call or write your nearest office for further details.

TYCOL

INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh • Philadelphia • Chicago
Detroit • Tulsa • Cleveland
San Francisco • Toronto, Canada

TIDE WATER ASSOCIATED OIL COMPANY

17 BATTERY PLACE · NEW YORK 4, N. Y.

*LEARN WHAT THIS PRODUCT CHARACTERISTIC MEANS TO YOU — READ "LUBRICANIA"

This informative handbook, "Tide Water Associated Lubricania," gives clear, concise descriptions of the basic tests used to determine important properties of oils and greases. For your free copy, write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

REFINERS AND MARKETERS OF VEEDOL — THE WORLD'S MOST FAMOUS MOTOR OIL

Shaft Packing No Chemical Can Attack

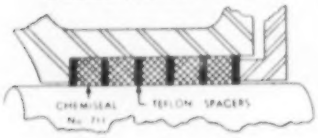
Teflon "Chemiseal" #711 Packing Stays in Service Months Where Other Packings Failed in Hours

"We've got a pump handling hypochlorites," a paper manufacturer told us, "and we can't find a packing that will last more than 5 hours." So we sent him a set of Chemiseal #711. It went into continuous service in November. It's still in there and going strong months later.

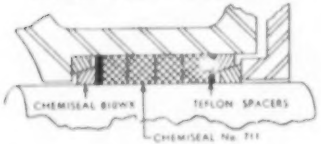
A steel plant tried a #711 packing last summer on a pump handling coke liquor. Recently they ordered #711 for 40 more pumps.

There are hundreds of similar cases in our files.

CHEMISEAL #711 SHAFT PACKING



CHEMISEAL #711WX SHAFT PACKING



No chemical — acid, solvent, caustic, oil or gas — can attack or dissolve a Teflon Chemiseal #711 or #711WX packing. "Chemiseal" non-corroding, non-contaminating, heat-resisting gaskets, packings, adapters and expansion joints can save you hundreds of dollars and countless production delays.

Phone, write or bring your gasket and packing problems to —

UNITED STATES GASKET CO.

648 N. 10th Street
Camden, New Jersey

spray which dries quickly into a gleaming, long-wearing wax coating.

The spray outfit includes, in addition to the gun, an oil and water extractor to trap impurities in compressed air line; a pressure regulator to insure accurate regulation of air pressure from 0 to 160 lb, and 25 ft of rubber covered hose and connections. Hose has breaking strength of 800 lb. Outfit is described as low priced, and the spray gun can be converted to spray paint, if desired. Binks Mfg. Co.

10—ELECTRIC LIFTER

For loading jobs, handling bulky equipment and heavy dies

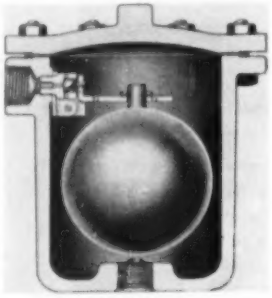
To operate the Shoplifter, just plug the conductor into the nearest outlet and turn the handle up or down to raise or lower the platform. Automatic stops are provided to prevent overrunning travel limits. The capacity of this lifter is 500 lb, but it can lift up to 550 lb without stalling motor, company states. Its motor is 1/3 hp electrically reversing type for service on 100 v single-phase 60 cycle a-c line, and platform speed is 16 fpm. Steel platform is 24 in. square and raises 54 in. above floor, lowers to within 5 in. of floor. Price, including foot operated floor lock, is $325.00.

Heavy duty model lifters of 1000 and 2000 lb capacities, cost $660.00 and $710.00. Economy Engineering Co.

11—VENT-DRAIN VALVE

Is improved automatic type with ball seating mechanism

By incorporation of a simplified ball-type seating mechanism, company has improved its automatic vent and drain valve to assure more accurate seating and longer life. Valve is said to be easy to install in water or oil piping systems to remove en-



trapped air, or in compressed air systems to remove water and oil. Operation is fully automatic, company explains, the cycle of filling and emptying repeating with each accumulation.

Sizes are available to take care of all air requirements up to 150 psi and water up to 125 psi. Body and cap of valve are cast iron, the float is copper, the ball is stainless steel. Crane Co.

12—EXPANSION JOINTS

Are compact, corrugated type for use where space is limited

Expansion and contraction caused by temperature changes in pipelines can be controlled by these packless expansion joints, according to manufacturer. They are available as controlled-flexing joints with control rings for high pressure, and free-flexing joints without control rings for lower pressure. Joints are claimed to be

Floor Space Reduced 50% in Assembly Parts Storeroom

Ohio Corp. Installs Rotabins, Cuts Labor Requirements in Half

Replacing old storage with modern equipment made possible important savings. Floor space was reduced from 1760 to 900 square feet, without loss of storage capacity. Aisles were wider and better lighted. One man can now do the work instead of two.

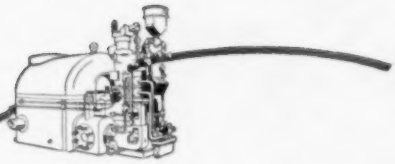
Rotabins increase space utilization because every square foot of storage has aisle frontage when needed. Each tray rotates easily on ball-thrust bearings: will not sag or bind when fully or unequally loaded. These rotary units are flexible and may be combined with straight shelving, as desired. A wide variety of tray and drawer arrangements are available to meet specific requirements.

Rotabins are made in many standard sizes to suit a wide variety of needs. Trays rotate around a heavy tubular steel stem secured to a solid circular metal base. Rotabins are durable, portable; require no bracing or fastening. Standard finish is olive green enamel, baked on.

Savings realized from the use of Rotabins can quickly pay for entire investment. Let F-G-M engineers help you plan most profitable layout. Write, 'phone or wire your requirements.

Send for illustrated Folder No. 220

The
Frick-Gallagher Mfg. Co.
SHELVING-PARTS — BINS — RACKS
COUNTERS — TABLES — BENCHES
410 Shubert Bldg., Philadelphia 2, Pa.



GA

Positive Safety when Engines, Turbines or Compressors Overspeed

GOLDEN-ANDERSON

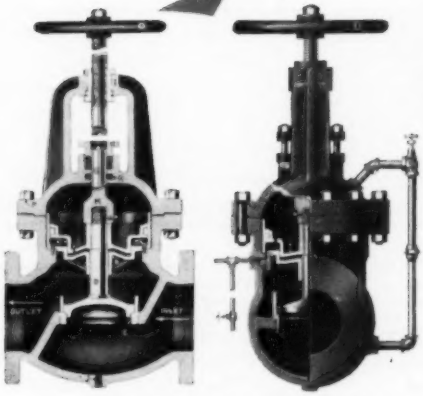
throttle and automatic engine stop

Valves

MECHANICALLY OR ELECTRICALLY TRIPPED

Golden-Anderson Throttle and Automatic Engine Stop Valves assure automatic shut-down and protection from damage when turbines, compressors or engines overspeed. A single speed governor trips a pilot control valve directly, or indirectly trips a solenoid-electric pilot control valve which causes this valve to automatically close against inflow pressure. All Golden-Anderson valves are cushioned by the "Double-Corliss" dashpot assembly to prevent banging and chatter.

Write for technical data.



G-A combined throttle and automatic engine stop valve, globe pattern.

GOLDEN-ANDERSON *Valve* SPECIALTY COMPANY

2072 KEENAN BUILDING · PITTSBURGH 22, PA.

LIFE AND PROPERTY PROTECTION
VALVES SINCE 1905

Do YOUR Concrete Floors get ROUGH?

You can 'case-harden' them with Lapidolith...make them extremely tough, wear resistant and proof against dusting!

Sound interesting? Other Sonneborn products solve building maintenance problems in even more amazing ways! Hydrocides for water control...scores of S.R.P. for rust. Mail coupon for free copy of book that gives full facts on 46 Sonneborn products—*one for every building maintenance problem!*

FREE! BUILDING PRODUCTS DIVISION
L. Sonneborn Sons, Inc.
80 Eighth Ave., New York 11, N. Y.
Send my FREE copy of *Building Service Handbook*.
NAME _____ POSITION _____
FIRM _____
STREET _____
CITY _____ STATE _____
Ask U. S. Patent Office

LAPIDOLITH
A Sonneborn PRODUCT

maintenance free and require no manholes for underground installation.

Joints come in copper, stainless steel or other alloys in sizes from 3 in. ID to 24 in. ID with single or multiple corrugations. May be had with flanged or welded ends. Special types may be ordered. Joints operate under pressure to 300 psi and temperatures to 1600 F. Expansion Joint Div., Chicago Metal Hose Corp.

13—BUILDING LOUVERS

Are designed to be weatherproof in both open and closed positions

The Airlouvers have heavy-duty frames and overlapping blades and are frabricated under a flexible set-up permitting a wide selection of sizes. With 74¾ in. by 48 in.

as maximum dimensions for a single unit, sizes as small as 11⅛ in. high and 12 in. wide can be obtained. By varying number of blades used, and cutting frames to suit width requirements, any size wall opening can be fitted with a pattern of equal-size units, company states.

Airlouvers are made in adjustable and fixed types, the former operated by any of several optional methods. Galvanized steel is standard material, but fabrication can be of copper, aluminum, Monel or A.P.M. Louvers are said to be extremely sturdy and to resist distortion effect of heavy air flow. The Swartwout Co.

14—MACHINE VISE

Is designed for accuracy, high power and long stroke

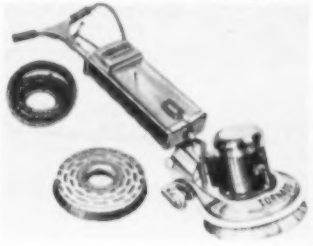
The increased power credited to the V.J.-Speed Model 811 Machine Vise is said to result entirely from the large diameter cylinder. Its accuracy can be maintained indefinitely, company states, because of adjustable gibs to remove any play which may develop from long hard use. The moving jaw is designed so the natural tendency to rise up from the jaw bed is prevented by the long arms which extend forward from the lower side of the jaw to provide leverage against unwanted jaw action.

The stroke of the standard model is 1¼ in. to facilitate holding of variable size pieces and use of plain and complicated holding fixtures. A 6 in. stroke is available for special uses. Jaws are 8⅜ in. wide and open to a maximum of 11 in. Van Products Co.

15—FLOOR MACHINE

Is improved, all-purpose unit for floor preparation, maintenance

Replaceable brush rings are an important feature of the new Tornado Floor Machines. The brushes are made up of in-



For thorough separation of HAZARDOUS FINE DUST

Bigger Filter Bag Area in HOFFMAN

HEAVY-DUTY PORTABLE VACUUM CLEANING UNITS

Maximum separation of fine dusts is accomplished in Hoffman vacuum cleaning equipment. Bag area is larger—for example, in the 3 H.P. Hoffco-Vac #30 (illustrated), a total of nine bags provide 30 sq. ft. of filter area.

Built for continuous *heavy-duty* service, Hoffman portable units (in 5 sizes) put real economy into your safety dust clean-up campaign with these outstanding advantages.

LARGER DUST CAPACITY

and higher vacuum mean you can do more cleaning for longer periods. Exclusive features for disposal of collected dust speed up cleaning operations.

LOW COST MAINTENANCE

Proved by hundreds of industrial plants who have established amazing maintenance-free records. No internal, mechanical wearing parts in the Hoffman vacuum producer.

WRITE A-713 and A-752 for Bulletins

HOFFMAN ALSO BUILDS MULTISTAGE CENTRIFUGAL BLOWERS AND EXHAUSTERS

Ask for Bulletin A-650

U. S. HOFFMAN
MACHINERY CORPORATION
AIR APPLIANCE DIVISION
101 FOURTH AVE., NEW YORK 3, N.Y.
CANADIAN PLANT: NEWMARKET, ONT.

stop coupling failures!

FIND OUT HOW *Koppers Engineers Eliminate Needless Downtime* IN YOUR PLANT!

These FAST'S COUPLING *Services save you money!*

UNSURPASSED ENGINEERING . . . Koppers engineers are acknowledged the best in the industry. Their practical knowledge, backed with 30 years' coupling experience, is at your service!

IMMEDIATE DELIVERY . . . All standard types and sizes are available for immediate delivery from "on hand" stocks. In case of emergency, just wire factory for special rush delivery!

LOWEST COST PER YEAR . . . Fast's Couplings will outlast equipment they connect if properly maintained. Their cost may be spread out over 25 years or more, offering you lowest coupling cost per year!

KOPPERS

FAST'S

THE ORIGINAL GEAR-TYPE

Couplings

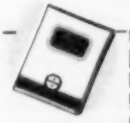
Before your plant is harassed by needless coupling failures—*call on Koppers!* Only Koppers offers you a two barreled solution to coupling problems: Fast's Couplings, the original gear-type coupling—and Koppers Engineering Service, acknowledged the finest in the industry!

For *30 years,* Fast's Couplings have been industry's standard for *long life* at *low cost.* Now, in addition, when you specify Fast's you get the *extra* advantage of Koppers valuable Engineering Service. Koppers engineers, backed with 30 years of Fast's Coupling experience, study your problem. Then show *which* Fast's Coupling you need (and more important) *why you need it!*

Only Koppers can offer you both Fast's Couplings and unexcelled engineering service—so before you buy *any coupling,* get the complete story on Fast's. Full details are contained in the Fast's Catalog. For your free copy, send the coupon today!

Send for

FREE CATALOG



KOPPERS CO., INC., *Fast's Coupling Dept.,*
2286 Scott St., Baltimore 3, Md.

Please send me a copy of Fast's Catalog relative to.....

.....(type of industry).

Name.....

Company.....

Address.....

City.....Zone.....State.....

MAGNETISM *at work*

NEW!

Fully Automatic, Non-Electric Dings Perma-Drum®—Answer to Many Iron Removal Problems...

IT'S automatic. It's trouble-free . . . clean as a whistle separation of magnetic and non-magnetic materials. The non-electric, permanent Alnico Perma-Drum Magnet is serving to protect machinery, prevent fires, purify products and many other separation applications.

Heat or moisture can't hurt this unit. Wearing? Armor-plate, abrasion resistant drum shell gives extra long life. Magnetic strength is *certified*. Magnetic permanence is *guaranteed*. If you are looking for an economical answer to a separation problem, ASK FOR PERM-A-DRUM CATALOG.

Non-magnetic material flows over revolving drum shell in normal trajectory. Magnetic materials are held fast to shell until carried beyond the magnetic field, at which point they are separately discharged.

DINGS MAGNETIC SEPARATOR CO.
4766 W. Electric Avenue, Milwaukee 46, Wis.

50 Years the Leader

Dings

MAGNETIC STRENGTH

dividual concentric bristle rings which may be replaced by operator. Only one metal brush back is required and bristle rings are secured to it by strong spring steel clamps. Attachment of brush is done by placing it on the floor, moving the machine over it and lowering into place. When switch is turned on the brush locks automatically, company points out, and a slight push with the foot when machine is stopped releases the brush.

Company's Foam-Feed brush design is incorporated to insure even distribution over working area when the solution regulator is turned on. Handle is adjustable. In addition to scrubbing, waxing and polishing this machine is recommended for sanding, steel wooling, pumicing and removing floor stains from all types of floors. Breuer Electric Mfg. Co.

16—MULTI-PURPOSE GREASE

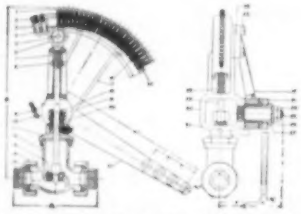
Has high melting point and is pumpable at low temperatures

Alvania, a new all-purpose industrial grease, is now available in larger quantities. Manufacturer describes it as a "million stroke" grease because of its ability to resist structural breakdown, and it is said to provide great resistance to both heat and water. Alvania is pumpable even in unheated storage, company states, but maintains its consistency, keeps leakage at a minimum, and has high oxidation stability. Shell Oil Co.

17—CONTROL VALVE

Is adjustable lift-opening lever type for maintaining flow ratio

An adjustable cam on the No. 235 Control Valve is used to provide method of fixing valve lift at required position at any point within range of valve movement, company explains, making it suitable for maintaining a ratio such as oil flow and air flow in an oil-fired steam boiler. This is claimed possible because, right on the job, with control system in operation, the oil flow may be varied to match the air flow. This is also intended for other processes where flow of two fluids must be kept within a certain ratio.



Valve has a flexible cam sheet (16), attached to cam arm (17), which is rotated by lever (21). Curvature is adjusted by screws (1). Roller (6) is attached to valve stem (29) and forced upward against cam sheet by spring (28). Lift of valve, stem and disc away from valve seat follows curve of cam sheet, on line set by screws, which fixes ratio of valve lift opening to operating lever movements.

This valve is recommended for stable control of steam, oil, water, air or gas and particularly for controlling flow to oil or gas burners, the speed of steam driven blowers or stokers, or flow of steam to steam atomizing oil burners. The Atlas Valve Co.

18—MOTOR STARTER

Is a-c magnetic, non-reversing type, in NEMA sizes 0 through 4

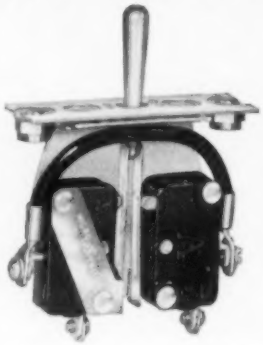
Designed for either across-the-line starting of squirrel cage induction motors, or as primary switch for wound rotor induction motors, the Life-Linestarter is intended to provide complete protection of motor, machine and operator. Only moving part is a "see-saw" lever balanced on a knife-edge bearing or center fulcrum. It cannot stick, company states, and a positive-action kick-out spring insures uniform operation. Company's De-ion operating principle is incorporated to extinguish arcs in a half-cycle or less. Insulating parts are said to be non-carbonizing, and shock resistant.

Starter can be applied to all integral horsepower motors up to 100 hp, in standard a-c voltage ratings from 110 to 600 v at frequencies of 60, 50 and 25 cycles for three-phase four-wire and single-phase operation. Heavy-gage sheet steel enclosure is finished with gray enamel. Up to four electrical interlocks are available. Line terminals are at top of starter assembly, load terminals at bottom to provide "straight-through" wiring. Westinghouse Electric Corp.

19—SWITCH ARRANGEMENT

Is 3-position momentary contact type with special circuit design

The 1AT1 consists of a metal bracket in which a self-centering toggle lever and two V3 type switches are mounted. One switch is normally closed, the other normally open, with a jumper wire connecting



their common terminal. With lever at center position, the normally open switch is open, the normally closed switch is closed. Operating lever to right closes the normally open circuit and operating lever to left opens the normally closed one.

Unit weighs approximately 2 oz. Electrical rating of switches in this assembly is 10 amp 125 to 250 v, a-c; 10 amp 28 v d-c, non-inductive load; 6 amp 28 v d-c, inductive rating. Micro Switch.

20—STAKE CAR

Is three-wheel type with 600 lb load capacity in addition to driver

The new Salsbury Stake Car has a 6.5 hp engine and is coupled to an automatic transmission to give ramp climbing ability and ease of operating control without manual shifting. The load is cradled by transverse leaf springs to independently sprung front wheels. Non-reversible worm-type steering gear is controlled by an automotive steering wheel. Car has coil spring rear suspension for riding comfort. Wayne Mfg. Co.

21—ROTARY PIPE JOINT

Is intended for swivel and slow revolving applications

The design of this joint eliminates wedge action of ball against gasket, manufacturer explains, thus turning torque is almost eliminated. The ball is held in place by a Belleville spring. Also, its small amount of side flexibility is claimed to reduce possibility of wear or breakage from side strain.

The joint is intended to perform without leakage at extreme temperatures and extra heavy models are available for extreme pressures and vacuums. Successful performance at continuous rotation up to 30 rpm is reported, and joint is said to handle practically all fluids and gases including corrosive acids and alkalies. Comes in 90 deg angle and straight designs in $\frac{1}{8}$ to 1 in. pipe sizes. Barco Mfg. Co.

22—PRICE CALCULATOR

For easy determination of brass alloy wire and strip prices

This slide-window type calculator is designed to save thumbing through price sheets. It shows at a glance the price per pound of high brass 70 per cent; low brass 80 per cent; rich low brass 85 per cent; commercial bronze 90 per cent, and gilding metal 95 per cent, as well as strip from 16 to 35 B and S gage. Delivered prices of quantities from 1 lb to over 30,000 lb may be computed. Printed on the face is a handy conversion table showing relation of Brown and Sharpe gages to inches. Calculator is free to qualified plant engineers. Voico Brass and Copper Co.

COPY

Blueprints

Drawings, Records

. . . Faster,

Easier

PORTAGRAPH IS THE EFFICIENT WAY to copy drawings or blueprints • to make black and white working copies • to revise details without retracing entire drawings • to restore old drawings or protect new ones • to copy vendors' reports, specifications, statements, correspondence • to complement all other reproduction processes.

With Portagraph you get a sharp, high contrast negative which can be used to make either permanent working copies on opaque stock or ink-like tracings on transparent stock. Portagraph tracings are more permanent than ink copies, do not smudge, will withstand many erasures. They can be used in any of the multiple reproduction units.

SIMPLE TO OPERATE—Positive pressure control, automatic timer help to assure uniform high quality prints.

NO DARKROOM NEEDED—Expose and develop Portagraph copies right in your office in ordinary subdued lighting.

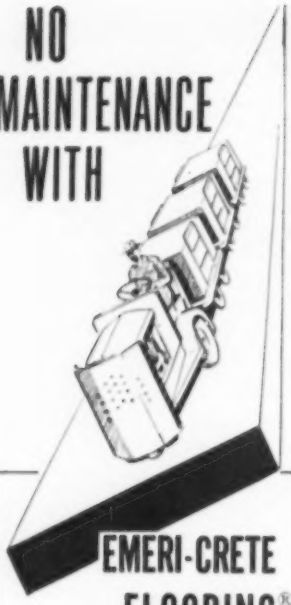
SAVES MONEY—Portagraph paper is pre-cut to standard sizes, eliminates trimming waste. It is available sensitized on one or both sides.

MEETS ALL REQUIREMENTS—Choose from three Portagraph models. Largest copies up to 40" x 60", has vacuum seal pressure control to produce maximum contact between original and photopaper.

GET FREE BOOKLET—Write to Management Controls Library, Room 1346, 315 Fourth Avenue, New York 10, N.Y.

Copyright 1950 by Remington Rand Inc.

NO MAINTENANCE WITH



EMERI-CRETE FLOORING®

MADE WITH CORTLAND EMERY AGGREGATE

DIAMOND-HARD FOR HEAVY-DUTY USE

For bruising traffic, wherever constant trucking or moving of heavy loads and equipment is necessary, wherever slipping is a hazard . . . EMERI-CRETE FLOORING® is the perfect solution! *Practically eliminates floor maintenance!* Ideal for new floors or resurfacing old floors.

EMERI-CRETE® is easily laid by your maintenance crew or local contractor using only Cortland Emery Aggregate, cement and water. Virtually indestructible.

Get FREE PROOF-POSITIVE Folder No. 601 Today

Learn how Emeri-Crete Flooring® soon pays for itself—why hundreds of leading plants in every industry are enjoying years of *maintenance-free service—how you can make your own test of Emeri-Crete Flooring®!* Contains complete story, lists users, types of industries and many installations.

WALTER MAGUIRE COMPANY, Inc., Dept. PE-6
60 East 42nd Street, New York 17, N. Y.

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

EMERI-CRETE FLOORING

Reg. U.S. Pat. Off.

Data File and Library

STANDARD CATALOGS, bulletins and handbooks are listed here to aid plant engineers in maintaining a permanent, up-to-date data file. To get copies of any of these just write on card which is on heavy insert elsewhere in issue, number preceding desired bulletin

VALVES

201 Valves and Specialties for Corrosive Services—Gate and needle valves, screw machine products, hose nipples, tubes, flanges, hot rolled bars and welding electrodes described in Bulletin W-350-35B are made of Worthite, a stainless alloy produced for company's in equipment for handling various corrosive solutions. Gives sizes, specifications for equipment listed, includes photos. Worthington Pump and Machinery Corp.

202 Blow-Off Valves—Bulletin B-424 is a 24-pp catalog covering blow-off valves for low and medium pressure boilers. Describes and illustrates construction details for seatless valves and double-tightening valves. Includes specifications, dimensions, weights and prices on valves and parts. Pictures many installations. Yarnall-Waring Co.

203 Gate Valves—Specifications, sizes, and dimensions for bronze gate valves of heavy duty construction for use on steam, water, oil, or gas lines are provided in pocket-size Circular 102. Brief text discusses maintenance, installation and operation. Illustrations show screwed and bolted bonnet types, design features. The Kennedy Valve Mfg. Co.

204 Reducing Valve Engineering Data—Bulletin 962 presents data on pressure reducing valve, explaining how its streamlined contour contributes to efficiency of performance. Discusses and illustrates valve's straight-line flow, wide opening, tight closing and other design features. Includes sizes, dimensional data and steam and air capacity charts. A. W. Cash Co.

205 Air Control Valves—Folder A illustrates 20 air-controlled valves, showing two-way, three-way and four-way air flow and indicating open, closed and exhaust positions. Text briefly covers special design features, sizes, basic types, capacities and available metals. Valvair Corp.

206 Air Release Valves—Bulletin 1200, 8 pp, devoted to company's air release valves, includes a discussion on air in water pipe lines and the essential requirements for valves of this type. Illustrates methods of installation and explains valves' construction and operation. Covers types for standard, high pressure and special services. Contains photos and diagrams of the valves and a large cross section showing materials of construction. Simplex Valve and Meter Co.

207 General Service Valves—Bulletin E-160, 16 pp, describes and illustrates the design and construction of company's quick-operating valves, explaining their application to blow-off service and on fire protection, chemical process, soot blower, water column blow-down, and other types of pipe lines. Included are tables of dimensions, weights and list prices for straight lever and rack-and-pinion types, inside packed and with outside stuffing box, and with screwed or flanged ends. Everlasting Valve Co.

MATERIALS HANDLING

208 Overhead Handling Equipment—In Bulletin C-1, 56 pp, are more than 100 photos of overhead handling equipment in use in all types of industries. Sketches

Clean as a Whistle!

***if* you clean metal parts . . . here's how Pangborn can save you money!**

Year after year users testify that Pangborn Blast Cleaning Equipment cleans metal parts at a profit! One manufacturer writes that Pangborn saves him *$5452* yearly on cleaning costs. Another small plant finds Pangborn cleans *more* metal parts, yet saves $11,000 annually on labor!

Savings up to 50% and more in cleaning time are not unusual for Pangborn users. A plant in Texas reports Pangborn Equipment cleans what was formerly a full *8-hour* job in *just 20 minutes.*

If you want to cut cleaning costs—Pangborn is your best buy! For 46 years Pangborn has been famous for the right cleaning equipment for every job.

Write for Free Bulletin

Bulletin 1200 contains specifications, data and illustrations. Write for your free copy to: PANGBORN CORPORATION, 299 Pangborn Blvd., Hagerstown, Maryland.

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

Announcing the NEW JENKINS SWINGTITE

with an exclusive new design that assures smooth action, positive closure, and longer life

Fast-Action Bronze Gate Valve

125 lbs. Steam
200 lbs. C.W.P.

In the new Jenkins SWINGTITE Fast-Action Bronze Gate Valve, the exclusive rolling disc and guide track design lengthens valve life and assures maximum tightness as it prevents uneven wear of seating surfaces. As the valve is opened or closed, guide rims around the seating surfaces of discs roll freely over guide tracks cast in the body, distributing wear evenly, dislodging foreign matter, and providing a polishing action for seating surfaces.

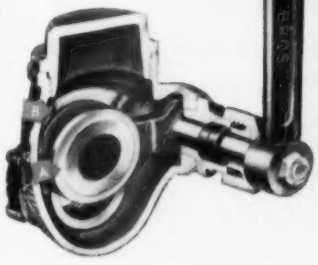
The SWINGTITE can be opened or closed instantaneously and easily with less than a quarter turn of the malleable iron lever which activates the self-adjusting ball and socket type double disc.

Wherever full, free flow is essential . . . where valve opening or closing must be instantaneous . . . you will see more and more Jenkins SWINGTITE Bronze Gate Valves setting new standards of performance and endurance. They are recommended especially for such services as laundry machinery, dish-washing equipment, gasoline and fuel oil lines, fire extinguishing steam lines in kitchens, and dispensing lines to tanks or vats.

Get all the facts on the new Jenkins SWINGTITE. Find out how much smoother-operating, how much *longer-lasting* these fast-action Bronze Gate Valves can be when *Jenkins* builds them. Send for the new folder, Form No. 196, containing full details. Jenkins Bros., 100 Park Avenue, New York 17, N.Y. Jenkins Bros., Ltd., Montreal.

Sold through leading Industrial Distributors

NO OTHER VALVE of its type HAS THIS FEATURE



Notice the guide rims (A) of the discs which rotate freely on the guide tracks (B) cast in the body, as the valve opens or closes. This roller action provides a self-cleaning and polishing effect, and also distributes the wear, since the seating position of the discs changes with each closing. Rapid, uneven wear is prevented, and continuous tight closure assured.

JENKINS VALVES

LOOK FOR THE DIAMOND MARK

TRADE JENKINS MARK

Jenkins Bros

Better EQUIPMENT PROTECTION Lower MAINTENANCE COSTS BY CHANGING TO PLASTILUBE
THE SUCCESSOR TO GREASE

★ NEVER MELTS
★ NON-BLEEDING
★ MULTI-PURPOSE
★ WATER RESISTANT
★ BETTER ADHESION
★ PHASE MAINTAINED
★ BETTER PUMPABILITY
★ COSTS LESS TO USE

Cost-conscious firms now lubricate with PLASTILUBE—you can benefit like hundreds have by placing your order today

THE Warren REFINING & CHEMICAL COMPANY
CLEVELAND 13, OHIO

The Warren Refining & Chemical Company
DEPT. PE
CLEVELAND 13, OHIO
Rush my sample of PLASTILUBE

Over 50 Years

of trolleys, cranes, switches, track and auxiliary equipment show construction, safety features, electrical advantages. Book also discusses engineering services offered, includes data sheet for requesting information on special problems. The American Monorail Co.

209 Industrial Jacks—Catalog 50 is a 28-pp ordering book covering single acting rachet lowering jacks, track jacks, screw jacks, hydraulic jacks, push and pull jacks, reel jacks and related equipment and accessories. Gives sizes, capacities, weights; tells applications. Templeton, Kenly & Co.

210 Materials Handling Equipment—Catalog EL, 90 pp describes most types of company's power trucks, power jacks, stackers and cranes, hand trucks, platforms and storage racks, and related equipment. Fully illustrated with photos and drawings it includes specifications, capacities, sizes and application data. Lewis-Shepard Products Inc.

211 Handling and Processing Equipment—Catalog 791, 32 pp, presents line of feeders, bin valves and level indicators, reduction machinery, vibrating screens and processing equipment, magnetic separators, elevating and conveying machinery, barrel packers, electrical controls for vibrating units, also chains and transmission machinery. Illustrated with photos and sketches of units and installations. Gives typical applications and advantages of equipment, explains operation, includes specifications, sizes. The Jeffrey Mfg. Co.

212 Conveying Systems Manual—Unloading and conveying of dry pulverized material are discussed in 24-pp Bulletin FK-25. Text covers complete system and its operation, also stationary pump and related equipment and is illustrated by photos and dimensional drawings, with sizes listed. Several installations of conveying equipment are described and pictured. Also presents an air compressor for use with conveying systems, and remote-control unloader. Fuller Co.

213 Electric Hoists—Catalog H-46 is a 44-pp manual covering monorail and stationary hoists and car pullers and providing helpful information on fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, types of controls and factors to be considered before ordering. Contains full specifications and dimensional data, illustrations of models, many photos of installations. American Engineering Co.

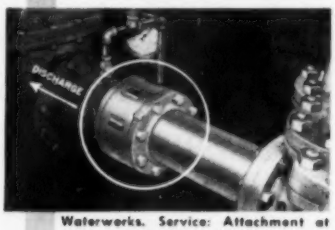
214 Freight Elevator Buyer's Guide—How to integrate selection of freight elevators with materials handling needs is among questions answered in Booklet B-4402, 44 pp. Ten illustrated sections explain basic considerations involved, also component parts of freight elevators. Covers lifting capacity and size; control systems; methods of door operation; layouts for standard freight elevators; types suited to plant needs; budget price information, and typical and special installations. Elevator Div., Westinghouse Electric Corp.

215 Overhead Handling Equipment—This is a booklet of engineering and application data on company's tramrail equipment. In addition to discussing what this equipment can do toward increasing a plant's handling methods, it illustrates and describes in detail the system's rail and arch design, switches, cranes and transfer bridges, hand operated carriers, hoists, cranes, buckets and grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

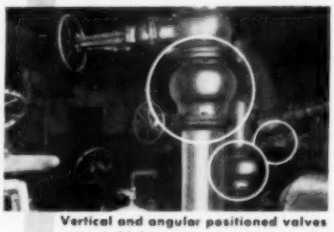
216 Conveying Equipment—Illustrated Bulletin 147R presents roller conveyors designed for efficient handling of cases, crates, boxes and containers. Photos show flexibility and other features of the equipment, also special models and typical installations. Speedways Conveyors, Inc.

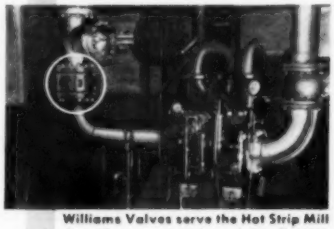
217 Wheeled Lift Jack—This bulletin tells how one man and a pair of company's jacks can handle loads up to 2000 lb. Shows how a twist of the toggle arrangement lifts the heavy, bulky load off the floor and puts it on roller bearing wheels. Stresses efficiency in moving crates, file cabinets, display fixtures. The Winklemann Co.

WILLIAMS-HAGER
flanged
Silent check
VALVES



Waterworks. Service: Attachment at small end of 6" by 10" increaser.


Vertical and angular positioned valves protect high pressure pumps at the Longview Fibre Company.


Williams Valves serve the Hot Strip Mill descaling systems in a large Eastern Steel Mill.

on duty
EVERYWHERE

Dependable protection against water hammer in any position . . . silent operation . . . renewable disc and seat . . . built of materials to suit your installation's needs, in standard pipe sizes from 1" to 20". *Write for Bulletin WH 100.*

THE WILLIAMS GAUGE CO.
Pump Valves . . . Water Gauges . . . Gauge Cocks . . . Steam Traps . . . Pump Governors . . . Feed Water Regulators . . . Water Columns
2913 PENNSYLVANIA AVE. • PITTSBURGH (12), PA.

218 Lifting Equipment—Bulletin 445 describes and illustrates hand-operated platform lifting devices in both light and heavy duty types, with capacities from 500 to 2000 lb. Includes several photos of these portable elevators in use, handling dies, shop fixtures, barrels, vats. Economy Engineering Co.

219 Manual on Overhead Conveying Systems—This comprehensive handbook, Conveying Manual A-86 contains more than 200 pp of information from manufacturer's catalogs on overhead track systems and conveying equipment. Book is generously illustrated with photos of equipment, installation and construction details, and it provdes full engineering and application data as well as complete catalog listings of equipment. Richards-Wilcox Mfg. Co.

COOLING, AIR CONDITIONING HUMIDIFYING, VENTILATING

220 Conditioning Units—The advantages of self-contained conditioning units and their applications in cooling, dehumidifying and cleaning are given in illustrated Catalog 1307, 40 pp. Explains installation and operation. Includes complete engineering data on direct expansion cooling, cold water cooling, hot water heating, steam heating. Also includes speed and horsepower tables, dimensional data on both horizontal and vertical types, pyschometric chart and typical problems involving choice of unit size, number of rows of coils, determining speed and motor horsepower. Clarage Fan Co.

221 Humidifiers—Illustrated Bulletin 1772 covers line of steam humidifiers, including two new air-controlled models. Includes discussion of dry air problems, tables on desirable relative humidities and regain of hygroscopic materials, complete data on operation and installation of both electric and air-controlled types. Also tells how to select humidifiers, giving capacities and prices. Lists and illustrates air-operated and solenoid-operated valves for use in humidifier control. Armstrong Machine Works.

222 Cooling Towers—Section 42 covers induced draft cooling towers for small water-cooled air conditioning and refrigeration condensing units. Illustrates towers and pumps, and discusses applications, operation and installation of the towers, giving specifications. Includes typical installation diagram, capacity and performance tables, also tower and pump selection table. Binks Mfg. Co.

ELECTRICAL

223 Round Type Ventilators—Engineering data necessary to the selection of the correct ventilator for individual plant conditions is presented in 16-pp Catalog V-13-49. Discusses factors influencing efficiency of roof ventilators and features to be checked before undertaking their selection. Describes and illustrates gravity type, several fan types and a foundry type, giving specifications, dimensions and exhaust capacities as well as general ventilator data. Photos show several installations. H. H. Robertson Co.

224 Motor Data—Bulletin MU-185 is a collection of more than 60 pp of engineering and descriptive data on company's line of motors. Covers many types, including splash-proof and explosion proof motors, gear motors and motors intended for use in chemical plants, for oil well pumping, punch press motors, elevator, crane and hoist motors. Illustrated throughout; includes price lists. Wagner Electric Corp.

225 Voltage Control—Bulletin 547, covering variable transformers and voltage regulators, illustrates and describes available models, stressing their special features and including specifications, dimensional data, ratings and connection arrangements. Also presents electronic electro-mechanical regulators. Includes price list. The Superior Electric Co.

226 Selenium Rectifiers—Booklet DB-19-025 on standard and high-voltage selenium rectifiers for power supplies and electronic circuits gives efficiency curves for both types, together with discussions on efficiency and service life, back leakage and

★ This unique roof structure is a Robertson invention, the Monitor Ventilator. The effect is like opening the roof to the sky, but still keeping the weather out. Tremendous volumes of air are removed from the building—free. Expert engineering assures adequate replacement air, and your satisfaction.

Here's an example: The working temperature in one plant was reduced 57°F. And done without mechanical equipment. A Robertson Monitor ventilator, running the length of the roof, exhausted from 500,000 to 800,000 cu. ft. of stale air, heat and fumes every minute.

Your heat or smoke problem can be cured, too, if you go about it in the right way. Don't think first about specific ventilating devices. Start an analysis of the conditions you have in relation to the conditions you want. Then install the type of ventilator that does the job with complete satisfaction, at lowest cost. This is *Engineering Ventilation.*

The Robertson company has been engineering ventilation for forty-four years, all over the world. Take advantage of this experience—you'll be happier with the results.

Our catalog shows we make all types of ventilators. We don't need to carry a torch for any one—just the right one for your needs.

Write for Free Ventilator Catalog

H. H. ROBERTSON CO.

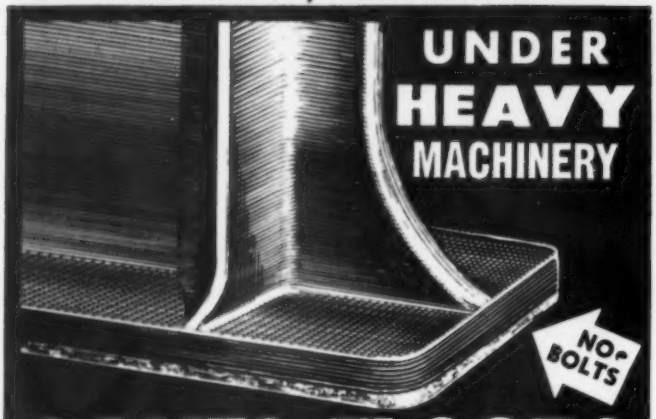
2419 Farmers Bank Building
Pittsburgh 22, Pennsylvania

Offices in 50 Principal Cities
World-Wide Building Service

There's a Robertson Ventilator for Every Requirement

FABREEKA

FOR IMPACT SHOCK, VIBRATION AND NOISE



SAVES FLOORS AND FOUNDATIONS

In its field the uses of Febreeka are unlimited . . . for reducing the destructive effects of heavy impact shock and transmitted high frequency vibration . . . and for reducing noise.

- USED "IN COMPRESSION" Gives High Safety Factor
- GREAT STRENGTH—LONG LIFE
- NO TROUBLESOME PERMANENT SET
- CONTROLLED RESILIENCY
- EXTREMELY HIGH DAMPING
- GREAT STABILITY

GET Your COPY

Used In And Under Heavy Machinery Since 1934

SAVES INSTALLATION COSTS

No Bolts Needed When Used With Fabreeka Cement

HELPS IMPROVE QUALITY AND QUANTITY OF PRODUCTION

SAVES MAINTENANCE

Less Metal Fatigue
Fewer Breakdowns
Less Down Time
Less Upkeep

SAVES $ MONEY $

SEND FOR "FABREEKA IN INDUSTRY"

FABREEKA PRODUCTS COMPANY, INC.
222E SUMMER ST., BOSTON 10, MASS.

Please send FABREEKA IN INDUSTRY—your New Folder describing Fabreeka, the unique and proven material for absorbing impact shock, vibration and noise.

NAME .....
TITLE .....
FIRM .....
ADDRESS .....

reverse resistance and forward resistance. Life characteristics of both cell types for various overload conditions or high ambient temperatures are plotted graphically. Includes tabular presentation of schematic diagrams, formulas for calculating rectifier performance, and cell ratings. Westinghouse Electric Corp.

227 Capacitor Motor—Bulletin GEA 5401 presents integral horsepower, single-phase capacitor motor, illustrating and discussing its compact size, transfer mechanism, bearings, and terminal board. Emphasizes long service and protection against damage, breakdown and operating wear afforded. Also stresses motor's easy installation and quiet operation and explains company's motor exchange plan. Gives specifications, characteristics of motor, and elaborates on construction features. Apparatus Dept., General Electric Co.

228 Power Distribution Feeders—Catalog TEB-1, 40 pp, is devoted to heavy-duty units used as main feeders in company's power distribution system, giving construction details, engineering data, application tips. Includes comparative analysis between this and other methods of power distribution on basis of cost and performance. Also contains full listing of parts, telling how to specify, order and install equipment. The Trumbull Electric Mfg. Co.

229 Volt Ammeter—A seven-range, clip-on volt ammeter is discussed as to design and use in illustrated List In. 17V. Explains special features in detail and includes dimensional data, price. Ferranti Electric, Inc.

230 Precision Switches—Catalog 81, 20 pp, covers industrial switches for a-c circuits. Describes and illustrates general purpose basic switches, reset basic switches, auxiliary actuators, enclosed switches, explosion-proof and splash-proof types, limit switches and extra small switches. Includes full ordering information, technical data and definitions, price list and discount schedule. Micro Switch.

231 Answer Card—Rules of thumb for answering questions on capacities and applying power-factor-improvement are printed on a double card small enough to fit in plant engineer's wallet. With this card he can quickly compute the answers to the questions: How many kilovars? What power factor? How much voltage rise? Simplified diagrams illustrate formula for quick computation. Apparatus Dept., General Electric Co.

232 Power Transformers—Bulletin TU-181, providing more than 108 pp of descriptive and technical data, contains sections on power transformers and unit substations of both dry and liquid-filled types, on transformer performance and on company's transformer manufacturing facilities. Text is fully illustrated. Wagner Electric Corp.

233 Switch Tips—This is a regularly issued publication filled with good ideas and helpful suggestions on use of company's snap-action switches. Will be mailed to plant engineers who request it. Micro Switch.

234 Selector Switch Data—Here is an engineering data folder complete with target sheet to aid plant engineers in understanding and applying company's push-pull-selector switch. Features detailed illustrations, descriptions and typical applications. Explains in detail how switch provides a single master control that will serve eight to 16 operations by pulling the handle to start, pushing to stop. The target sheet is intended to assist in plotting electrical control requirements. The Arrow-Hart & Hegeman Electric Co.

235 Improved Voltage Regulation — The unit-type construction, low maintenance quick-breaking tap changing, automatic control and other advantages of company's new transformer-type ⅝ per cent step feeder voltage regulators are illustrated and discussed in detail in Bulletin 01B6056C. Generously illustrated with photos and drawings, it provides full oper-

(Continued on page 92)

Bulletins on Current Plant Problems

(Continued from page 28)

concrete flooring, citing tests results and listing its many advantages. Twelve installations are pictured. Walter Maguire Co., Inc.

142 Cement Floor Finish — This illustrated folder on one of company's iron cement products shows how it provides hard, easily cleaned floors, and seals leaks, masonry joints and cracks and openings around pipes. Smooth-On Mfg. Co.

143 Concrete Vibrators—Vibrating floats for concrete and mastic floors, form vibrators and flexible shaft vibrators for mass concrete placement are presented in this illustrated bulletin. Includes application information, specifications and many photos of equipment in use. Syntron Co.

144 Sand Conditioning Equipment — Catalog 26-A describes a heavily constructed sand conditioning machine recommended for use on medium to heavy foundry floors. Explains the sandcutter method of conditioning sand. Discusses in detail and illustrates by photo the machine's features of construction, giving specifications and general dimensions and performance data. Also includes photos of installations. American Wheelabrator & Equipment Corp.

HEATERS, HEATING

145 Aluminum Heat Exchanger Tubes—Engineering and application data covering manufacturer's aluminum heat exchanger tubes is given in 24-pp Bulletin AD-186. Fully illustrated with photos, it presents performance and cost advantages of the tubes, explains their fabrication, the effect of cooling water, inhibitors, cathodic protection. Also discusses aluminum alloys used and the special advantages of each, and the use of aluminum alloys in shells and headers, tube sheets, baffles and support plates and flanges. The applications of aluminum tubes in several industries are given. Also included are fluid flow and heat transfer characteristics, estimating data, allowable internal working pressures, nominal composition of wrought aluminum alloys and list of standard warehouse items. Aluminum Co. of America.

146 Gas Unit Heaters—Company's unit heaters with cast iron heat exchangers are described in this revised folder. Photos illustrate heater, burner assembly, heat exchanger and combustion chamber. Includes specifications for six sizes, ranging from 85,000 to 215,000 Btu per hour. Automatic Gas Equipment Co.

147 Turbine Driven Heater—Illustrated Bulletin TH-2 covers a unit heater which is driven by a steam turbine, the exhaust from the turbine being piped into the heater section for heating the air. Complete details of the design and construction together with engineering data and dimensions on both revolving and fixed discharge units are included as well as a table on mounting heights and coverage. Piping details are also shown. L. J. Wing Mfg. Co.

148 Water Heaters — An instantaneous steam injection water heater designed to provide hot water as needed, is described and illustrated by photos and drawings in this bulletin. Explains how this packaged heater is different, how its pressurized piston works and tells its special advantages. Specifications given. Pick Mfg. Co.

149 Radiant Gas Burners — Industrial heat processing techniques with radiant gas burners designed to beam high temperatures to materials at the speed of light are described in Bulletin S-11. Explains design and operating principle of company's radiant burner, its uses, advantages and control afforded. Photos show many applications. Selas Corp. of America.

TUBING, PIPE FITTINGS

150 Flexible Tubing—Introduced in Catalog 5-4 is a lightweight spiral-type tubing for ventilation and products conveying. Illustrated with many photos of tubing in use, it explains tubing's flexibility and versatility and discusses four types giving recommendations for best usage. Lists substances to which tubing is resistant and illustrates construction features. Also shows how connections are made and includes performance data and air friction chart. Repair kits and other accessories are described and pictured. Flexible Tubing Corp.

151 Handbook on Fittings and Flanges—Catalog wr-1950, 88 pp, is packed with working information on manufacturer's seamless carbon steel welding fittings and forged steel flanges. In addition to presenting standard schedules with their specifications, list prices and sizes, this book gives information on dimensional tolerances; American standards flange facings with dimensions; thread standards and threading practice; service pressure ratings, physical and chemical requirements for flanges, nuts and bolts; plus sizes and wall thicknesses of welding fittings stocked in other metals such as stainless steels, Inconel, pure nickel or Monel, aluminum, deoxidized red brass. Grinnell Co., Inc.

152 Pipe Fittings—Here's an illustrated data sheet covering threadless union pipe fittings, tees and couplings for connecting black or galvanized pipe without threading of pipe ends. Tells how fittings are used and how to install them. Includes sizes and prices. Union Products Co.

153 Welding Fittings — Price List 52W provides net prices and ordering information on company's line of fittings—elbows, return bends, stub ends, tees—in Types 304, 316 and 347 stainless steels, covering light, standard and heavy pipe thicknesses. The Cooper Alloy Foundry Co.

CLEANING, MAINTENANCE EQUIPMENT

154 Heavy Duty Cleaning Equipment—How vacuum cleaners, cleaning tools and accessories contribute to better housekeeping and, in turn, to increased efficiency, are shown by photo and text in Bulletin 22-396. Illustrates equipment for rough cleaning jobs, wet or dry cleaning, furnace and boiler cleaning. General Electric Co.

155 For Cleaning Bins — Form 122 describes and illustrates a cleaning tool for use on parts bins and display tables, which affords both brush and plow action. Doyle Vacuum Cleaner Co.

156 Magnesium Ladders — The light weight and safety features of company's magnesium ladders are emphasized in illustrated Bulletin L-70. Discusses merits of these ladders, gives approximate weights, sizes and specifications for both extension and single-type ladders. The Patent Scaffolding Co., Inc.

157 Rust Preventive — This illustrated bulletin emphasizes rust and corrosion preventive qualities of a protective coating for use on both old and new iron, steel and galvanized iron surfaces. Explains how this coating inactivates rust action, is durable and fume resistant, and has high elasticity. Discusses both primer and finish types available and how to apply them. L. Sonneborn Sons, Inc.

ALARM, CALL SYSTEMS

158 Alarm Service Annunciator—A unit type audible and visual annunciator designed for alarm services in public utilities and industries is illustrated by photo and described as to construction and operation in this bulletin. Stresses economy and adaptability of the annunciator and gives mounting and installation suggestions. The Superior Appliance Co.

159 Annunciator—Of special interest to plant engineers is this bulletin illustrating and describing the function and construction of company's annunciators for use in control panels, control desks, in public utilities and industries. Actual size illustrations of the unit's plastic windows with two styles of engraving are presented. Also included is a schedule showing dimensions of the annunciator with from one to 400 windows, as well as illustrations of typical conditions and occurrences which may be indicated. The Autocall Co.

WATER TESTING AND SOFTENING

160 Water Hardness Test—Bulletin 2HX-7446 explains company's simplified methods of determining total hardness in water, discussing method's practicability and accuracy. Tells reagents used, procedure and principle of method. Three-step procedure and test kit are illustrated by photos. Allis-Chalmers Mfg. Co.

161 Water Clarification and Softening—Bulletin WC-103 on water clarifiers and cold process softeners describes the de-

Use this CARD for information on ADS and NEW PRODUCTS also

June, 1950

Card void after 6 months.

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

.....

.....

.....

.....

.....

Your Name .....

Your Title .....

Your Company Name .....

Company Address .....

City ..... State .....

(If you prefer delivery at your home also fill below)

Home Address .....

City ..... State .....

.....

.....

.....

Also, use this card for more information on advertised products.

sign, operation and features of manufacturer's unit of this type, with explanations in tabular form. Introductory sections explain principles and chemistry of cold process water treatment, and compare company's reactivating equipment with other methods of water purification. Various accessories are also described, and bulletin is illustrated with diagrams and installation photos. Graver Water Conditioning Co.

TAPES, FABRICS

162 Tape As a Tool—Pocket Catalog 1-641, intended as a guide for plant engineers, production and maintenance men, presents tape as a handy and useful tool. Lists dozens of company's Polyken tapes, giving specifications and uses. Actual sample strips of the tape are reproduced with magnified sections to show construction. Stresses effective performance of these tapes in a wide range of industrial tape applications. Includes tips on selecting right tape for the job. Bauer & Black Div., The Kendall Co.

163 Self-Adhesive Tape—Eight varieties of self-adhesive tape which may be printed to user's order are described in this folder. Gives specifications and recommended uses and colors. The Topflight Tape Co.

164 Coated Fabrics—Bulletin 11 lists and describes coated fabrics for a wide variety of industrial applications. These include cotton base, nylon base and Fiberglas base fabrics, and cover neoprene, Buna N, and natural rubber coatings, as well as hycar, neoprene and natural rubber sheet stock and uncured coated fabrics and uncured sheet stock. Includes widths, gages, tensile strengths, weights and recommended uses. Vulcan Proofing Co.

SAFETY, SANITATION

165 "Wet" Water for Fire Fighting—Recommended techniques for the use of company's Pyrodene capsules to make "wet" water for fire extinguishing purposes are explained in this booklet. Discusses advantages of "wet" water methods of application to Class A, B, and C fires. Gives capacities of automatic blending equipment, prices of both blenders and capsules. Aquadyne Corp.

166 Group Washing Equipment—Hand-controlled and foot-controlled washfountains designed for use by two or more persons and for installation in industrial plants, institutions and public buildings are the subject of Form 9663. Tells advantages of group washing equipment, gives specifications, materials of construction, standard equipment and typical roughing-in data. Includes photos of several models, also illustrates and provides data on multi-stall showers, drinking fountains and accessories. Bradley Washfountain Co.

167 Death to Insects—This small folder presents an electric insect exterminating unit which kills flies, roaches and the like by electrocuting them. Tells advantages of unit and where it should be placed for best results. Insect Electrocuter Co.

MISCELLANEOUS

168 Machinery Isolation—This illustrated bulletin covers the use of company's isolating pads as machine mountings or as component parts to control impact shock, vibration and noise. Describes and illustrates the construction of this cotton and rubber material and explains how it functions. Photos show some of the machines it is used with, and there's a list of the types of machines and equipment for which it is recommended. Fabreeka Products Co.

169 Magnetic Analysis—Bulletin 1130 tells how company's magnetic research laboratory is set up to serve industries by determining whether various substances can be magnetically separated and by finding the best means of doing it, as well as by developing and improving magnetic separation machinery. Lists some of the hundreds of materials tested and illustrates some of the laboratory equipment used, also several types of separators. Dings Magnetic Separator Co.

170 "Custom Made" Files—How to design and build "custom-made" files at low cost by means of standardized, mass-produced equipment is the subject of Booklet SC-677. Through the use of company's intermembered, interchangeable file cabinets which house interchangeable file sections of many types and sizes, virtually any kind of file installation can be set up to suit needs of any plant office, according to the booklet. Fully illustrated, it shows several of the many variations of this equipment, pointing out how it reduces expense, saves floor space and affords flexibility to any arrangement of files. Full data, including dimensions of cabinets and sections, is provided. Remington Rand Inc.

171 Oil Flusher—A compact, portable oil flusher for machine cleaning is introduced in this bulletin. Illustrated by photo and sketch, it tells how unit is built, what its advantages are, and how it is operated, covering such factors as starting and stopping, pumping, pressure, reducing flow, cleaning filters. Fox River Tool Co.

172 Compressed Air Handbook—This 16-pp booklet, prepared by organization's committee on engineering education, presents a brief discussion of compressed air as an important form of power, showing the application of compressed air and gas theory to actual machines and uses. It outlines how air is compressed, machines employed in compressing air and gas, and basic principles of the utilization of air power. Illustrated with photos and sketches, its main sections are devoted to the uses and theory of compressed air and types of compressors. Although written primarily for engineering students, it contains much of interest for the engineer whose work involves the supervision of compressed air lines and equipment. Compressed Air and Gas Institute.

173 Pulverizing Machine—This bulletin describes and illustrates manufacturer's new model impact-type pulverizer. Explains new features incorporated in design and construction. Illustrates machine and a typical installation. Pulva Corp.

174 Turbine Repairs—Vol. 8, No. 1 of Metco News tells of the economy of metallizing in turbine repair work, citing several case histories in which savings were effected by this method. Illustrates several examples of turbine repair jobs. Metallizing Engineering Co., Inc.

175 Oil Seals and How to Use Them—Bulletin PK-46A is a 16-pp handbook of useful data for plant engineers needing information on oil seals. Photos show where to use the seals and how to install them. Drawings illustrate how the lip and heel construction of these non-metallic oil seals can be varied. Booklet is divided into sections on principle of company's seals, their construction, advantages in various applications, installation data and other information. Johns-Manville.

176 Rotary Cleaner—Catalog 134 presents a rotary table type machine designed for abrasive blast cleaning of small, flat, fragile or thin section castings, forgings, stampings or heat treated parts. Features and operation of the cleaner are explained and illustrated, and its use for shot peening discussed. Material and electrical specifications, dimensions are included. Photos show many installations. American Foundry Equipment Co.

177 Diesel Engine—Form 10,026-A is a specification sheet on manufacturer's new smaller and lighter diesel engine for continuous heavy-duty service. Cutaway illustrations show design features of the engine and rating and performance curves are included. Ingersoll-Rand Co.

178 Mechanical Tubing—Bulletin TB-324 describes ways in which increased production, lower manufacturing costs and short cuts to improved design may be achieved by means of company's service embracing a complete range of steel tubing. This includes seamless, as well as welded, tubing, hot-finished or hot-rolled, cold-drawn or cold-rolled in a carbon alloy and stainless steels, in various finishes. The Babcock & Wilcox Tube Co.

179 Industrial Cylinders—Bulletin 300 gives dimensions and weight, ratings and limitations of company's new medium-duty line of cylinders for operation by air, oil, water, or steam, and provides same information for heavy-duty and super-duty cylinders. Factors affecting the selection of cylinders are presented along with illustrations and designs of rod and head attachments. Also describes completely cylinders, rod and head attachments which are available from stock. Ledeen Mfg. Co.

181 Lightweight Castable—This is a small illustrated folder providing a technical description of a lightweight refractory. Also gives comparative thermal conductivity and product's strength and constancy of volume at various temperatures. Harbison-Walker Refractories Co.

182 Conversion Table—Data Card TDC-1110A is a linear conversion table for handy reference by engineers who frequently wish to convert inches and fractions of inches into decimal parts of a foot. It is suitable for many purposes in addition to those encountered in the application of steel tubing. The Babcock & Wilcox Tube Co.

183 Dry Dampers—Illustrated with layout diagrams of typical reversing damper and seat assembly and a stack damper and guide assembly, Bulletin FD-49 stresses uniform draft and temperature control and other features of company's dry dampers. The Ohio Steel Foundry Co.

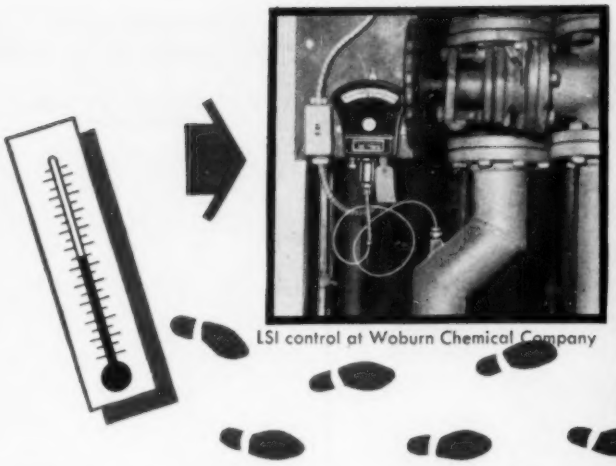
Use this CARD for information on ADS and NEW PRODUCTS also

FIRST CLASS
PERMIT No. 353
Sec. 34.9, P. L. & R.
CHICAGO, ILL.

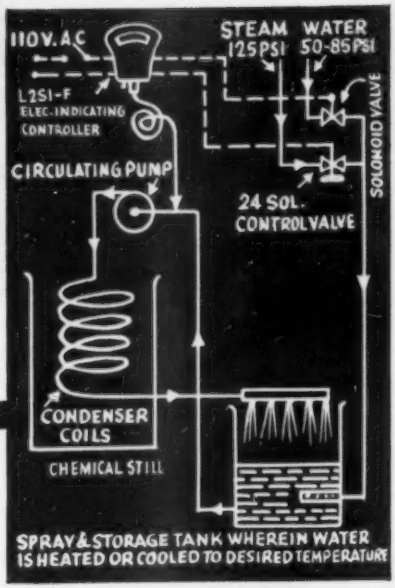
BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

4c POSTAGE WILL BE PAID BY—

PLANT ENGINEERING
110 South Dearborn
CHICAGO 3, ILLINOIS



LSI control at Woburn Chemical Company



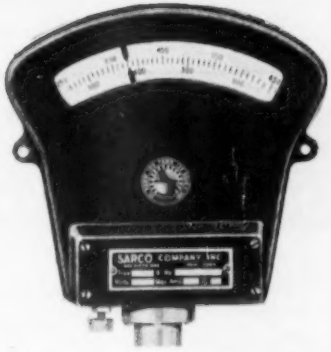
How Sarco Saves
A THOUSAND STEPS A DAY

—and prevents disaster, because this fatty acid condenser taking material at 550°, clogs up whenever the cooling water get *below* 90°. The thermometer at the condenser is several hundred feet away from the hot and cold water valves leading to the circulating tank. Seldom exactly right and often in the danger zone, changing conditions called for trips to and from the valves many times a day.

Now the Sarco L2SI Electric Control at the condenser opens and closes the valves by remote control as needed. When a batch comes through requiring 130 degree cooling water, a twist of the wrist changes the control setting.

Why not make your plant automatic with Sarco; have all temperatures where you want them, all the time? You will be surprised to see how little Sarco Controls cost compared to what they will do for you.

The Sarco Representative can look over your tanks, processes, hot water and heating systems in a few hours.



The Sarco L2SI Electric Control actuates cold and hot water valves as often as required. Setting can be changed by turning thumb screw. Temperature indicated on large dial selected to include only the range of temperatures to be controlled. Thousands in use in Chemical, Food, Plating and other process plants. Bulletins Nos. 1000 and 1025.

240

SARCO SAVES STEAM

SARCO COMPANY, INC.
Represented in Principal Cities
Empire State Building, New York 1, N. Y.
SARCO CANADA, LTD., TORONTO 8, ONTARIO

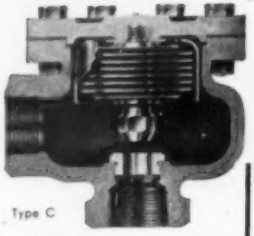
IMPROVES PRODUCT QUALITY AND OUTPUT

Leading Processor

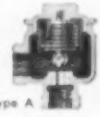
SHORTENS OPERATION from 65 to 45 Min.

With Nicholson Steam Traps

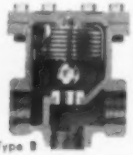
Records of a recent installation of Nicholson steam traps, by a large food packer, show they cut cooking time 30%; e. g., one operation was shortened from 65 to 45 min. Nicholson units keep equipment full of live steam because: 1) they operate on lowest temperature differential; 2) have 2 to 6 times average drainage capacity. Also record low for steam waste; and maximum air-venting capacity. Widely specified for preventing damage to thin gauges; eliminate cold blow in unit heaters.



Type C

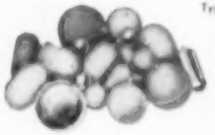


Type A



Type B

Type AHV



5 TYPES FOR EVERY PURPOSE—Size ¼" to 2"; press. to 225 lbs. BULLETIN 450.

HIGH-PRESSURE FLOATS—Stainless, monel, steel or plated steel. Welded. In all sizes and shapes; for operating mechanisms and as tanks or vessels. 2-day delivery. BULLETIN 348.

W. H. NICHOLSON & Co., 208 Oregon St., Wilkes-Barre, Pa.

DOWNTIME REDUCED from 15% to .5% on packaging machines!

PeKa TRAVEL LOG alone obtained these amazing results for one company, thus helping to push those constantly rising COSTS DOWN at a time when prices have been checked by competition. LET TRAVEL LOG DO THIS FOR YOU!

TRAVEL LOG RECORDS
- QUANTITY PRODUCED
- PRODUCTION RATE
- DOWNTIME
- OPERATING TIME

OPERATOR writes
- EXPLANATIONS

Write for Full Information to

KNOPF INSTRUMENT COMPANY

250 CULVER AVE., JERSEY CITY 5, N. J.

(Continued from page 88)

ational and engineering data on the regulators. Allis-Chalmers Mfg. Co.

MECHANICAL POWER TRANSMISSION

236 Flexible Couplings—Catalog PC-50 describes and illustrates roller chain flexible couplings for direct power drive applications stressing design features. Includes selection data, ratings, dimensions. Also includes descriptive and ordering information on coupling covers. Whitney Chain & Mfg. Co.

237 Chain Drives—Engineering Catalog SCE-50, 68 pp, provides data on company's silent chain drives, giving their advantages, recommended applications. Also gives information on chain length calculation, installation and maintenance, dimensions, ratings, prices. Actual-size photos illustrate chain types, pitch. Includes full ordering data on sprockets.

Catalog CR-48, 16 pp, contains similar information on company's roller chain drives. Both books are available; ask for either or both. Whitney Chain & Mfg. Co.

238 Power Drive—This folder promotes use of company's power drive units designed for many speed reducing jobs, to permit variable speed reduction for any ¼ to 2 hp drive requirements. Gives sizes, specifications, range of speed reductions and prices for both regular models and a heavy duty model. Pictures some of drive's many uses. The Flinchbaugh Co.

239 Power Drive Handbook—Catalog 709 contains a complete description of company's roller chain and sprockets. Includes tips on selecting stock roller chains for every type of power drive service and other useful data. Diamond Chain Co., Inc.

PUMPS, COMPRESSORS

240 Centrifugal Pump Care—Sixteen-pp Bulletin 08X6256A is a revised handbook on the care of all makes of centrifugal pumps, giving the how and why of pump construction and their effect on pump maintenance. This informative booklet tells how to figure head and it carries tables to help determine friction loss. Causes and cures for various sources of troubles are offered along with a new maintenance timetable. Also included are little known facts about cavitation and how to protect pumps against it, water's as a pump lubricant, common mistakes in packing stuffing boxes. Allis-Chalmers Mfg. Co.

241 Turbines, Pumps, Compressors—Bulletin 1181A provides an over-all presentation of company's line of steam turbines, centrifugal pumps, multi-stage pumps, and pumps specially designed to handle viscous fluids and oils, as well as blowers and compressors, and worm gear speed reducers. Includes photos of models and installations, cutaway illustrations and sectional diagrams to show design features. De Laval Steam Turbine Co.

242 Pumping Units—Bulletin 4303 is devoted to centrifugal pumping units with fan-ventilated drip-proof motors. Includes photos of pump assembly and parts, cutaway illustration. Provides full specifications and dimensional data, also selection chart for various capacities and heads and key to selection chart for 60 cycle motors. The Deming Co.

243 General Service Pumps—Bulletin 30, covering company's helical gear pump, explains its "progressing cavity" principle of operation and lists some of the wide variety of materials this pump is designed to handle. Dimensions, speeds, capacity information and other data are included for both the standard type and the tubular type for higher pressures and greater resistance to abrasion. Illustrated with cutaway drawings, photos of pump installations. Pump Div., Robbins & Meyers, Inc.

244 Pump Cups—Form 4502 is on company's improved material for packing pistons of air and hydraulic cylinders and reciprocating pumps. Explains how these

"Pumcups" are designed to lengthen service periods and packing life and reduce cylinder wear. Describes and illustrates types of hydraulic machines in which they are used. Includes sizes and engineering data on the cups and discusses special pistons manufactured for them. Bulletin also cites several case histories of installations. Darling Valve & Mfg. Co.

PIPING, TRAPS, SAFETY HEADS

245 Steam Trap Manual—"Solving Steam Trap Problems," 36 pp, covers correct trapping practice for unit heaters, jacketed kettles, autoclaves, submerged surfaces, hospital, kitchen and laundry equipment, steam mains, header drips etc. Tells how to select size and determine lift of trap. Explains theory, operation, maintenance; gives details of simplified piping for steam traps. Also discusses float traps, air release valves and pipe line strainers. Specifications, capacities and some prices are given. Book is illustrated throughout and includes condensate and steam tables. The V. D. Anderson Co.

246 Steam Traps—Impulse traps for power plant, steam distribution systems, industrial steam processes are described in 16-pp Bulletin T-1739. Illustrated with photos, cutaway and sectional drawings, it tells how to figure sizes needed, gives application data, installation and operating suggestions, capacities, weights, dimensions and prices. Yarnall-Waring Co.

247 How to Select Steam Traps—Contending that there is no universal trap, Selection Chart 1600 describes and illustrates thermostatic, inverted bucket, float thermostatic, and liquid expansion types giving advantages and recommendations for use. Includes table showing first and second choice of trap types for 34 applications. Sarco Co., Inc.

248 Pipe Hangers—Ninety-pp Catalog 10-D is a buyer's guide for adjustable pipe hangers and supports. Covers hangers for attachment to pipe and to structure, hanger assemblies, spring hangers, hanger rods, pipe supports and related equipment. Each type is described and illustrated by photos and dimensional diagram and listed with sizes, prices. Catalog also includes standard specifications, photos of installations and terms of sale. Indexed, ring punched. Grinnell Co., Inc.

249 Steam Traps—Bulletin 315 presents company's smaller steam traps designed for greater performance capacities. Illustrates and explains their design and operation, tabulates sizes and capacities and includes prices of traps and accessories. Also describes briefly and illustrates a differential drainage and boiler return system. Stickle Steam Specialties Co.

250 Safety Heads—Bulletin A-47 is an 8-pp booklet covering safety heads, safety head flanges, safety head rupture discs and relief valves, automatic chemical feeders and pressure vacuum vent valves. Twenty-seven photos and drawings illustrate products and fittings. Charts give capacities, ratings and specifications. Black, Sivalls and Bryson, Inc.

251 Steam Pipe Line Products—Folder 349 is an over-all presentation of manufacturer's products for the distribution and utilization of steam, gas and liquids. Includes photos and brief descriptions of heat exchangers, expansion joints, flow and condensation meters, strainers, traps, and separators. American District Steam Co.

252 Steam Separators—Bulletin S-14-C, presents line of separators for removing unwanted elements from steam, air and other vapors. It is profusely illustrated with photos, diagrams and line drawings, gives full specifications, selection and ordering data on company's helico-centrifugal separators of both vertical and horizontal types. The Swartwout Co.

253 Small Pipe Markers—Bulletin 144 describes and illustrates, in color, self-adhesive pipe markers for identifying small diameter pipe and conduit, from ¼ to 2 in. dia. Description also covers other sizes of markers for larger pipe and conduit. Markers shown conform to ASA standard

WILEY

New Books and Editions

KENT'S MECHANICAL ENGINEERS' HANDBOOK

12th Edition. This famous handbook has been completely rewritten with all latest information. It covers every important topic in M.E., including: plastics, statistical quality control, servomechanisms, gas turbines, diesel locomotives, and atomic power. 172 authorities have contributed material that is reliable, concise, and consistently useful. In two volumes:

DESIGN & PRODUCTION

Edited by COLIN CARMICHAEL, *Editor, "Machine Design." May 1950. 1660 pages. $8.50.*

INDUSTRIAL INSTRUMENTATION

By DONALD P. ECKMAN, *Cornell University.* Organizes the science of measurement on its own physical and chemical bases. Principles, analysis, operation, and applications of measurement are covered for temperature, pressure, rate of flow, and composition. *June 1950. 396 pages. Prob. $5.00.*

PENDER'S ELECTRICAL ENGINEERS' HANDBOOK

Fourth Edition

Editor-in-Chief, HAROLD PENDER, *Consultant. Pender's* compact collection of practical data, charts and tables has been enlarged and completely rewritten for increased usefulness.

VOL. I—ELECTRICAL POWER

With WILLIAM A. DEL MAR, *Phelps Dodge Copper Products Corporation. 1949. 1716 pages. $8.50.*

VOL. II—COMMUNICATION-ELECTRONICS

With KNOX MCILWAIN, *Hazeltine Electronics Corporation. In Press. Prob. $8.50.*

STEAM TURBINES AND THEIR CYCLES

By J. KENNETH SALISBURY, *General Electric Company.* Presents in understandable terms the essentials of steam design of turbines. Coverage is complete—from basic principles to the most advanced thinking in the field. *1950. 645 pages. Prob. $7.50.*

POWER

Edited by J. KENNETH SALISBURY, *General Electric Company. May 1950. 1459 pages. $8.50.*

PLANT PRODUCTION CONTROL

Second Edition

By CHARLES A. KOEPKE, *Production Management Consultant.* This practical book has been rewritten and rearranged to give expanded coverage of, (1) the position of the planning and control function and, (2) the mechanism of operational detail. The author demonstrates the methods of controlling the flow of materials through any type of manufacturing enterprise. *1949. 508 pages. $5.50.*

CONVEYORS AND RELATED EQUIPMENT

Second Edition

By WILBUR G. HUDSON, *M.E., A.S.M.E.* This modernized manual supplies all the factors that must be considered when buying, equipping, operating, and maintaining conveyors and related devices. Principles of layout, performance possibilities, and problems of maintenance provide an accurate, thorough coverage of the field. *1949. 468 pages. $7.00.*

HEATING, VENTILATING, AND AIR-CONDITIONING FUNDAMENTALS

Second Edition

By WILLIAM H. SEVERNS and JULIAN R. FELLOWS, *University of Illinois.* All the material has been thoroughly revised so that this book is completely up-to-date with all the World War II and post-war developments included. Three completely new chapters have been added—on air conditioning, panel heating, and mechanical refrigeration applications to cooling and heating. *1949. 666 pages. $6.50.*

COPIES OBTAINABLE FOR 10 DAYS' EXAMINATION

ON APPROVAL COUPON

JOHN WILEY & SONS, INC., Dept. PE-6-50
440 Fourth Ave., New York 16, N. Y.

Please send me, on 10 days' approval, the books I have checked in this advertisement (or I am attaching to this coupon a separate list of the books I want). If I decide to keep the books I will remit $ plus postage; otherwise I will return the books postpaid.

Name .....

Address .....

City ..... Zone ..... State .....

Employed by .....

(Offer not valid outside U.S.)

Speer Here...

Speer carbon brushes are installed in hundreds of motor generator sets because they have good contact and long life . . . two mighty important brush requisites for dependable arc welding!

No matter what your brush requirements may be, you'll find that Speer's rigid testing under actual service conditions, have made the Speer carbon brush an outstanding performer regardless of load conditions. For maximum efficiency and smooth, trouble-free performance . . . insist on Speer carbon brushes for any motor or generator application.

U. S. Pat. 2,181,076

helps make sound welds here!

Speer

CARBON COMPANY
ST. MARYS, PENNA.

brushes · contacts · welding electrodes · graphite anodes · rheostat discs · packing rings · carbon parts

CHICAGO · CLEVELAND · DETROIT · MILWAUKEE · NEW YORK · PITTSBURGH

RESEAT VALVES AND BIBBS

IN PLACE

QUICKLY

ACCURATELY

RESEATING A BIBB

RESEATING A VALVE

PAYS FOR ITSELF ON FIRST 2 OR 3 JOBS!

Don't junk expensive globe or angle valves, bibbs, fixtures . . . reseat them! Cycle Skinner Valve and Bibb Reseater. Easy to use. Guaranteed cutters leave seat glass-smooth, level, tight.

1/4" to 2" $32.50
3/4" to 3" $45.00

M. B. SKINNER CO.
SOUTH BEND 21, INDIANA, U.S.A.

Be Well Informed About

ATOMICS

ATOMICS is published bi-monthly for engineers. The timely articles appearing in each issue are essentially practical in nature, written for the average engineer. A. W. Kramer, the editor of ATOMICS, has been a pioneer in interpreting and translating the complex, highly technical material issuing from the laboratory into language every engineer can understand. ATOMICS is the first regularly published journal of its kind. The issues sparkle with engineering data, news of atomic power, articles of timely interest to those concerned with industrial process control, practical material for men interested in the technical and engineering aspects of nuclear reactions.

ATOMICS, 110 S. Dearborn St.
Chicago 3, Ill.

for identification of piping systems. Sample marker included. W. H. Brady Co.

CONSTRUCTION

254 Roofing Manual—Full engineering data on manufacturer's roofings and their use is presented in Specifications 50, 38 pp. Covers not only coal tar pitch roofings, but also waterproofings, roof insulations, flashings, protective coatings. Includes illustrated instructions for the roofing of most types of roof construction, including methods of handling special conditions, amount of material required. Tar Products Div., Koppers Co., Inc.

255 Technical Data on Plexiglas—This is a file folder of technical and application information on Plexiglas sheets, rods and molding powders, covering their workability, physical properties, available thicknesses. Includes data sheets on the uses and advantages of Plexiglas in large area lighting, typical designs of coffers, photos of installations and a discussion of room lighting. Rohm & Haas Co.

256 Plexiglas Applications—This booklet illustrates many of the ways Plexiglas is now being used. Also gives physical properties, sizes and descriptive information about this acrylic plastic in sheet and rod forms and discusses molding powders and their use. Rohm & Haas Co.

257 Open Steel Flooring—This is a 24-pp illustrated catalog on riveted and welded flooring units for use as stair treads, platforms, walkways, decks, landings, runways, catwalks, boiler room installations, sidewalk gratings. Also covers anchors. Includes a typical layout for an open floor installation, also safe load table. Wm. F. Klemp Co.

258 Steel Grid—Form 405 explains and illustrates heavy duty steel grid for prolonging life of old and new industrial floors and traffic surfaces. Tells economy and other advantages of the grid and provides directions for use over various types of surfaces. Photos illustrate instructions, also show several interior and exterior installations. Wm. F. Klemp Co.

259 Fastenings Data & Reference Book—This fingertip-indexed, reference and data book on stainless steel fastenings is designed to provide you with complete application and authoritative reference information regardless of industry and application. Separate sections are devoted to machine screws, nuts, caps and bolts, wood and sheet metal screws, rivets, nails, or what-do-you-want? Also tells about the company's special item order service. Anti Corrosive Metal Products Co., Inc.

260 Filtered Daylight—Booklet BRA 3-0749 FSR explains how the filtering of sun's rays by means of windows and skylights made of a special heat-excluding glass can provide better light and increased comfort and other benefits. Illustrated with photos of several installations. It includes suggestions on selecting the proper type of this glass for individual plant requirements. Blue Ridge Glass Corp., Libbey-Owens-Ford Glass Co.

261 Hard Boards of Many Uses—This attractively illustrated 24-pp booklet is devoted to company's Presdwood and pictures many of the ways it is being used. Discusses its manufacture and adaptability and describes several available types for exterior and interior applications, giving physical properties of each type. Gives finish specifications and explains and illustrates edge and surface cutting, bending and finishing. Masonite Corp.

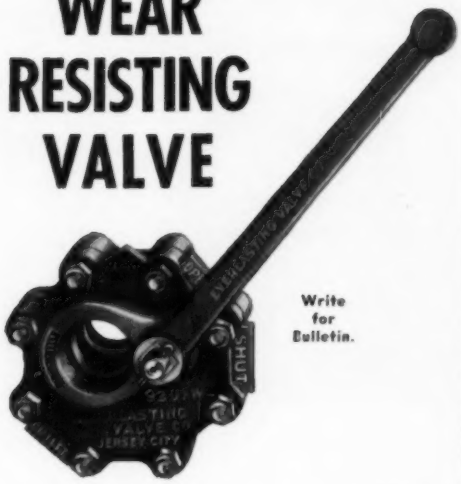
262 Steel Grating and Treads—Bulletin 2296, 24 pp, explains and illustrates the major advantages of manufacturer's "Electroforged" steel grating and treads, picturing many installations. Also includes sizes, specifications, safe load data and ordering instructions. Blaw-Knox Div., Blaw-Knox Co.

MAINTENANCE

263 Manual of System Planning, Preventive Maintenance—This 50-pp book covers complete story of electrical system planning and maintenance. Covers system functions; code reference chart; voltage

EVERLASTING

THE WEAR RESISTING VALVE



Write for Bulletin.

WILL NOT STICK . . . because made of materials which will not corrode under working conditions.

WILL NOT WEDGE . . . because disc travels in a line parallel with both interior of upper bonnet and seat.

WILL NOT CLOG . . . because straight-through design permits full, unimpeded flow.

A 70-degree turn of the operating wrench completely opens or closes the Straight-Lever Type of Everlasting Valve . . . and the operation is easy, because the wrench gives ample leverage.

Add to this valuable time-saving feature the many other important advantages of the Everlasting Valve . . . its drop-tight seal, its self-grinding action at each motion, its provisions against damage to disc and seat, and its "everlasting" wearing qualities . . . and you have a valve that is literally unequalled for many services on process lines, emergency shutoffs, equipment outlets, boiler blow-off, fire protection, etc.

EVERLASTING VALVE COMPANY
49 Fisk St., Jersey City 5, N. J.
Trade Mark "EVERLASTING" Reg. U. S. Pat. Off.

Everlasting Valves
for everlasting protection

QUESTION:

What Packings Are Specially Good for Rotary Pumps?

ANSWER:

Garlock
BRAIDED ASBESTOS PACKINGS

FOR WATER
- GARLOCK 730 or 733 patented Lattice-Braid
- GARLOCK 234 Square braid
- GARLOCK 244 Square braid—wire inserted yarn
- GARLOCK 644 Square braid—with lead strands

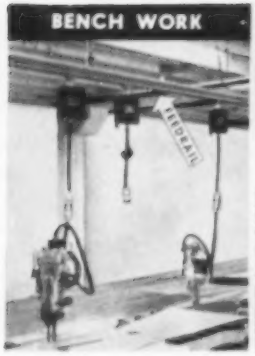
FOR OIL OR GASOLINE
- GARLOCK 237 Square braid
- GARLOCK 732 patented Lattice-Braid—with wire

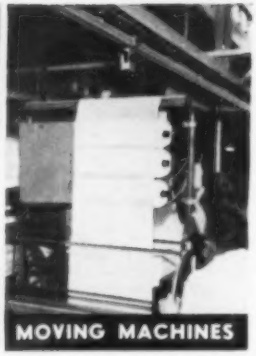
FOR MINERAL ACIDS
- GARLOCK 736 patented Lattice-Braid—blue asbestos
- GARLOCK 230 Square braid—blue asbestos

There's a GARLOCK Braided Asbestos Packing for use against hot or cold water, alcohol, dilute aqueous solutions, oil or gasoline, mineral acids, etc. The most widely used styles for rotating shafts are listed above.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK
In Canada: The Garlock Packing Company of Canada Ltd., Montreal, Que.

GARLOCK
PACKINGS, GASKETS AND OIL SEALS





WHAT - *no wires?*

That's about it when Electric Feedrail, the modern, totally enclosed, electrical distribution system is used.

One vertical cable connected to an overhead trolley, through an Ever-Lok trouble-proof connector — no wires to trip over, snag or tangle, no exposed circuits — and you can move the equipment along the line without disconnecting.

Feedrail is also ideal for cranes and hoists, moving test lines and lighting. In fact, anywhere electrical equipment moves. You can save wiring costs, maintenance time, speed up your plant, and make it electrically safe at the same time.

Ask for technical data and bulletins applying to your specific applications.

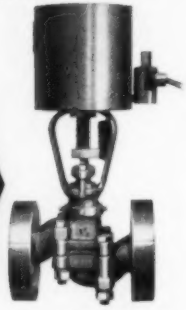
FEEDRAIL CORPORATION
Subsidiary of Russell & Stoll Company, Inc.
125 BARCLAY STREET • NEW YORK 7, N. Y.

At Last!...

A REMOTE CONTROL VALVE FOR

★ HIGH LINE PRESSURES
★ LARGER LINE SIZES
★ CORROSIVE AND EROSIVE FLUIDS

THE NEW
ANNIN
SERIES 1520
REMOTE CONTROL VALVE
ELECTRO-PNEUMATIC SOLENOID-OPERATED

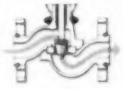


Service Range: Pressures to 3000 psi; Temperatures: — 300° F to 1000° F
Sizes: ¾" to 4"

Now you can have efficient remote fluid control in your plant at a reasonable cost. In the past, perhaps you have been limited by the size and maximum pressure ratings of solenoid valves or by the excessive cost of special alloy valves in erosive and corrosive service. If such has been the case, the obvious solution to your remote control valve problem is the new ANNIN Series 1520!

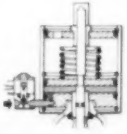
Here's why-

EXCLUSIVE SINGLE-SEATED VALVE BODY



Separable valve body with Teflon or other synthetic valve plug seating surfaces will withstand up to 3000 psi. Valve trim and plug can be replaced without removing valve from the line. Smooth internal flow channel, completely devoid of shoulders, pockets and threads, minimizes pressure drop across valve and facilitates handling of slurries or sludges. Available in Durimet 20, 316 Stainless Steel, Hastelloy, Zinc-free Bronze, Carbon Steel and almost any other castable alloy, this valve will give outstanding service under the most severe fluid conditions.

POWERFUL ELECTRO-PNEUMATIC OPERATOR



By introducing a secondary pressure system such as compressed air to the remote control system, ANNIN has utilized a sealed piston and cylinder arrangement for powerful valve action. This operator may be controlled by a 3- or 4-way solenoid pilot valve, a 3-way manual valve, or arrange for two-position direct-operation from any pneumatic, hydraulic, or electric-automatic control device. This flexibility plus the fast, shockless operation of the operator and valve, finds application in all types of remote control valve service.

SEND FOR NEW BULLETIN TODAY

THE ANNIN COMPANY
3500 Union Pacific Avenue • Los Angeles 23, Calif.

drop tables; power factor charts; guides for motor wiring; guides for lighting wiring; electrical system records; supplementary feeder schedule; preparing electrical plans; switchboard and feeder schedule; riser diagram of complete system; motor and control schedule; symbols for wiring plans; preventive maintenance; diagnosing system conditions; general system survey; load survey. Anaconda Wire & Cable Co.

264 Industrial Products for Maintenance and Construction—This catalog is a comprehensive collection of data sheets on company's line of industrial products. It gives product descriptions, specifications and directions for use. Covers heavy duty mastic floorings, asphalt protective coatings, waterproofing and dampproofing materials, resilient floor covering underlayments, industrial adhesives and cementing compounds, pipe wrappings and coatings, Expansion joint sealers and fillers and other products. The Flintkote Co.

265 Building Maintenance Manual—Sixty-four-pp Handbook 7 is packed with useful information on the applications of an extensive line of floor surfacings and other maintenance products, as well as leak stoppers, external wall sealants, road patching, roofing materials. Illustrated throughout with photos and sketches it provides complete product information and step-by-step instructions for use. An extremely valuable reference book, it shows how to analyze problem, select right product, estimate quantity needed and carry out the work. Flexrock Co.

266 Rolling Scaffolds—Sectional tubular steel scaffolds for maintenance, painting jobs are described and illustrated in Bulletin PSS-14. Tells how to assemble basic units and how to increase working area. Includes photos of interior, exterior scaffolds. The Patent Scaffolding Co., Inc.

267 Protective Coatings — Filled with photos of equipment and structures protected by Company's corrosion-preventive coatings, Form 948-A, discusses this coating, tells how surfaces should be prepared for it, suggests ways to apply it and recommends thicknesses. Gives specifications for several solutions and explains value of the coatings in industrial atmospheres, around chemical fumes and moisture and in presence of deteriorating soil conditions, high temperatures. Tar Products Div., Koppers Co., Inc.

268 Floor Finish—A quick-drying finish for wood floors, described as ready for traffic in 30 min., is described in this folder. Tells merits of the finish and how to apply it. Includes full color photos showing how various shades of this finish look on different woods. L. Sonneborn Sons, Inc.

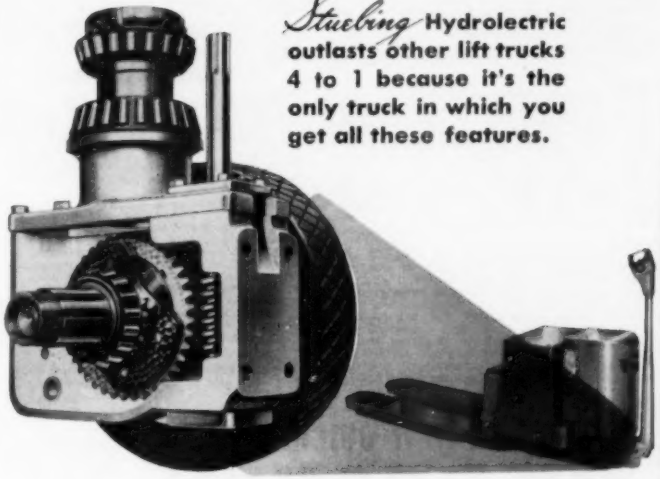
269 Protective Surfacing—Bulletin 1570 presents specifications and characteristics of company's silicone coating aluminum, telling some of its uses and advantages. Also briefly discusses surface preparation, coverage and application. The Dampney Co. of America.

270 Painting with Aluminum — Form Ad-228 is a comprehensive 32-pp brochure filled with factual information for all industrial users of aluminum paint. Basically, it explains how aluminum paints can be used to best advantage. It emphasizes that uses of aluminum paint by industry fall into three classifications: 1) for metal, concrete and masonry and other non-absorbent surfaces; 2) for weather exposed wood, and 3) for interior heated surfaces and decorative uses. Aluminum Co. of America.

271 Iron Cement Handbook—This pocket-sized 40-pp catalog on company's iron cements for repair work and other applications is filled with valuable suggestions for plant engineers. It discusses 10 different products and gives general tips on mixing and applying them. More important, it provides illustrated instructions for dozens of repair and maintenance jobs, including stopping leaks on steam boilers, strengthening corroded tank surfaces, reinforcing pipes, making flanged joints, stopping leaks in concrete. Smooth-On Mfg. Co.

272 Scaffold Bulletin—By means of photographs this bulletin shows some of the many industrial uses for portable upright

FOUR TIMES LONGER LIFE!



Stuebing **Hydrolectric outlasts other lift trucks 4 to 1 because it's the only truck in which you get all these features.**

1. *True differential gear drive, the same as in your auto.*
2. *Lifetime transmission, completely sealed in lubricant.*
3. *Complete elimination of old-style drive chains.*
4. *Larger motor and battery.*
5. *Four-wheel stability for smoother action.*
6. *Twin front driving wheels for increased traction.*
7. *Revolutionary easy steering and operation.*

These are the features that keep the Stuebing Hydrolectric on the job four times longer than other trucks. These are the features that hold maintenance costs on the Stuebing Hydrolectric to an absolute minimum—less than one-fourth that of other trucks. With four times the life and only one-fourth the maintenance costs of other trucks the Stuebing Hydrolectric is the lowest cost truck on the market.

As a Time-Saver alone the Stuebing Hydrolectric pays for itself two to four times yearly—it's the greatest producer of all Walkie Power Trucks.

Want proof? Let us send you Bulletin S. Full facts on the Stuebing Hydrolectric plus helpful data on how to select a lift truck.

LIFT TRUCKS INC. CINCINNATI

Lift Trucks Incorporated

Engineered by W. J. Stuebing

2425 SPRING GROVE AVENUE
Cincinnati 14, Ohio

scaffolds and illustrates special features of manufacturer's line. One page of pictures is devoted to showing how quickly and easily these aluminum alloy structures can be erected. Dimensions and weights included. Up-Right Scaffolds.

273 Drip Preventive Handbook—The insulation of pipelines, tanks, cold air conditioning ducts, and wall surfaces against corrosion and condensation drip is covered in this pocket-size, 32-pp handbook, Form P-17. Describes an insulation coating and its applications and tells how to prepare surfaces for it and apply it. Photos illustrate these instructions and show coating in use. Technical data includes tables showing pipe and tank surface coverage and humidity charts. J. W. Mortell Co.

DUST AND FUME CONTROL

274 Dust Collectors—Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this illustrated bulletin. Includes table of capacities, sizes, also photos of units. The Kirk and Blum Mfg. Co.

275 Electric Blowers—Illustrated Bulletin 573 describes portable electric blowers in ⅛ to 1½ hp sizes for removing dust, dirt, grit and grindings from motors, bearings, shafting and gears. Emphasizes economy of blowers in cutting production and repair costs and saving power. Attachments for use with blowers to make them applicable for industrial vacuum cleaning jobs are also presented. Breuer Electric Mfg. Co.

276 Dust Control—Bulletin 909A, 28 pp, covers necessity and economy of controlling industrial dusts and use of dust control equipment. Describes, illustrates and gives specifications for cloth screen collector. Gives application and engineering data and photos of several installations; also discusses other dust handling equipment. Includes questionnaire outline information needed for analysis of individual plant problems. Pangborn Corp.

277 Welding Fume Collectors—Bulletin 37-D describes and illustrates fume collecting equipment for welding operations. Discusses advantages of collecting fumes at the source, hood protection, good working range, easy installation. Illustrates regular, long-reach and special collectors, giving dimensions and application information. Also describes ventilated welding cabinet. Ruemelin Mfg. Co.

278 Vacuum of Many Jobs—Bulletin 144, 20 pp describes and illustrates 132 unusual industrial uses for company's vacuum system. Applications, listed alphabetically, range from the removal of dust from inside of rolls of adhesive tape to recovery of zinc dust. The Spencer Turbine Co.

279 Positive Displacement Blower—Publication 84 presents an axial flow, high speed blower for handling gas or air under pressure or vacuum from 20 to 15,000 cfm. Photos show complete unit, principal parts. Discusses advantages, lists applications, gives specifications. The Standard Stoker Co., Inc.

TOOLS, WELDING

280 Tool Catalog—Company's complete line of hand and power tools, tool sets, kits and related equipment is presented in Catalog T, 110 pp. Illustrated with photos of all items listed, it describes tools, includes sizes, applications, shipping weights, other ordering data. Snap-On Tools Corp.

281 Pipe Bending Tools—Pocket-size Bulletin E-201, 16 pp, describes hydraulic and hand operated units for bending iron, steel and non-ferrous pipe, rigid conduit, tubing and bus bars. Illustrates each type of tool and tells its applications, sizes. Also describes a power pump for hydraulic units. Stresses economy and efficiency of portable units for making tailored bends on the job. Greenlee Tool Co.

282 Welding Electrode Ordering Guide—Here's a handy pocket-size booklet, Catalog R7-7, filled with information covering electrodes for hard surfacing and for welding stainless steels, alloy steels and mild steels. Includes operating characteristics, sizes, current ranges, tensile strengths, polarity. Brief text covers applications for each class of electrode. Harnischfeger Corp.

283 Pipe Tool Ordering Guide—Catalog 50, 36 pp, covers entire line of pipe tools, machines, power drives, threading oil. Products are illustrated by photo and operational advantages fully explained. Includes concise ordering specifications, current price list. Beaver Pipe Tools, Inc.

INSTRUMENTS AND CONTROLS

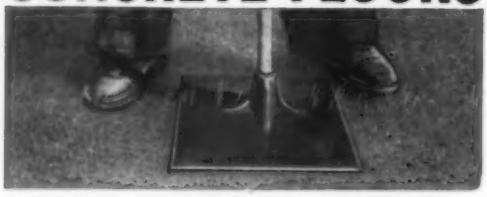
284 Smoke Indicator—Illustrated Bulletin SR 1006 explains economy of a photo-electronic smoke indicator, and includes diagram of an installation. Lists main features of the indicator and describes and illustrates a smoke violation indicator and additional bell for use with the unit. McNeill Engineering Co.

285 Self-Operating Regulator—Bulletin 329 contains information on a regulator for use on water and oil heaters, crude oil treaters, tanks, vats and other processing equipment. Includes tables helpful in selecting the proper size regulator and illustrates the broad scope of automatic control. Also contains layout drawings of several applications of this regulator. The Powers Regulator Co.

286 Laboratory Thermometers—Chemical thermometers, low temperature thermometers, laboratory thermometer sets, calorimeter and differential thermometers and special test thermometers for various applications are pictured and described in Bulletin C, 24 pp. Gives specifications, ranges and sizes and explains use of instruments. Also includes nomograph for emergent stem correction and conversion tables. Precision Thermometer & Instrument Co.

HERE'S THE NEW QUICK WAY TO

FIX BROKEN CONCRETE FLOORS



TAMP SMOOTH! TRUCK OVER!

Use durable INSTANT-USE . . . a tough, plastic, material which you simply shovel into hole — tamp — and run traffic over immediately. NO WAITING. Bonds tight to old concrete. Makes smooth, solid, heavy-duty patch or complete overlay. Withstands extreme loads. Keep a drum on hand for emergencies. Immediate shipment.

MAIL COUPON for FREE TRIAL OFFER and HAND BOOK OF BUILDING MAINTENANCE

INSTANT-USE

FLEXROCK COMPANY

3615 Cuthbert St., Philadelphia 4, Pa.

Offices in Principal Cities

Please send me complete INSTANT-USE information, details of TRIAL ORDER PLAN and HAND BOOK OF BUILDING MAINTENANCE—no obligation.

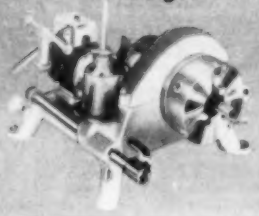
Name .....

Company .....

Address .....

BEAVER MODEL-C PORTABLE POWER UNITS

—the gears run in oil



Compare These 6 Beaver Exclusive Advantages

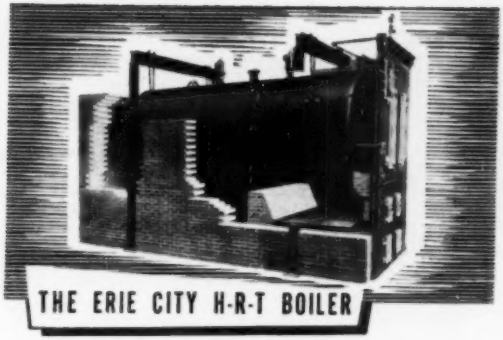
● Beaver Model-C Portable Power Units have six unbeatable sales advantages. They're exclusive with Beaver and help make Model-C the favorite of piping contractors everywhere. Check these extra advantages and make sure you have the fast-selling Beaver Model-C units available at all times:

1. All gears are fully enclosed — run in oil.
2. Safety switch-lock and chuck wrench holder — patent pending.
3. Patented safety lock — holds pipe tool handle firmly.
4. Heavy-duty ½" to 2" chuck — full size, full range.
5. Cast steel-iron housings insure greatest strength and maximum stability when driving geared cutters and threaders.
6. Conveniently located heavy-duty, weather-proof motor provides plenty of power. Properly located for safety, cool operation, longer brush and armature service.

Write today for new Beaver Catalog No. 50.
Address Beaver Pipe Tools, Inc., 210-300 Dana Avenue, Warren, Ohio, U.S.A.

50 Years of Friendly Service

BEAVER PIPE TOOLS



THE ERIE CITY H-R-T BOILER

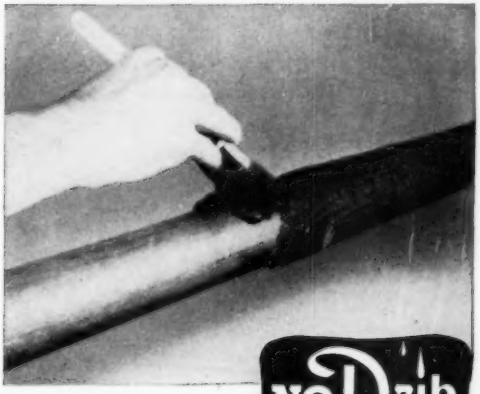
This old favorite is today fusion welded to eliminate riveted butt straps and seams. Modern X-ray inspects and verifies all welding. Available for all conventional methods of firing, including Dutch Oven settings and for waste heat recovery. Standard pressures to 200 psi. Higher pressures to order. Write for Bulletin SB-32.

ERIE CITY IRON WORKS • ERIE, PA.

1402 East Avenue

ERIE CITY

Complete Steam Generators • Type C 3-Drum Boilers • Type VL 2-Drum Boilers • The "Economic" Boiler with or without Water Walls • Welded H.R.T. and Vertical Boilers • Steel Heating Boilers • Pulverizers • Underfeed and Spreader Stokers



NoDrip

COVER PIPES, TANKS, WALLS

Anyone can brush, trowel or spray NoDrip on any clean, dry surface. Goes on like plaster, forms a seamless, protective coating. *Stops condensation drip.* NoDrip keeps equipment and floors safe and dry; prevents corrosion of metal and prolongs its life. Acid, alkali and brine resistant. Comes in 1, 5 and 55 gal. drums, ready for use.

TRY NoDRIP

Apply NoDrip to a small area, compare the results with uncovered portion.

Send for free NoDrip Handbook

J. W. MORTELL CO.

537 BIRCH STREET KANKAKEE, ILL.

You're looking at both sides of PROPELLAIR

. . . Showing Heat the Way Out!

Here you see the inside and outside of a powerful Propellair installation cooling an Eastern power plant. Twelve of these fans, mounted in metal penthouses on the roof, are moving hot air at the rate of 950,000 C.F.M. from turbine and boiler rooms. Sixty-inch blades are powered by 15 H.P. Robbins & Myers Uni-Shell motors.

ADAPTED TO YOUR NEEDS

Propellair quickly banishes dust, fumes, odors, moisture, heat. Capacities to 88,000 C.F.M. Made for ducts, hoods, roofs, windows, and with pedestals or stands.

DISCUSS YOUR VENTILATING PROBLEMS WITH EXPERIENCED PROPELLAIR ENGINEERS. NO OBLIGATION.

STAND MOUNTED

EXTENDED SHAFT PROTECTS MOTOR

DRUM TYPE FOR DUCTS & STACKS

PROPELLAIR

DIVISION OF ROBBINS & MYERS, INC.

SPRINGFIELD 99 OHIO

MAGNETIC SEPARATION

287 Separators and Detectors—This illustrated catalog describes permanent non-electric magnetic separators and electronic metal detectors. Specifications on weights, sizes and strength comparisons are given as well as tables of operating capacities for permanent magnetic pulleys, drums, pipeline traps. Eriez Mfg. Co.

288 Magnetic Equipment — Illustrated Catalog C-5000A covers magnetic separating and detecting equipment. Includes photos, descriptive and application information, sizes and capacity data on electric and non-electric pulleys and drums, rectangular magnets, lifting magnets, non-electric plate and liquid line magnets, roll and cross belt separators, and other equipment. Dings Magnetic Separator Co.

STEAM

289 Steam Generators—A bulletin compiled to present information needed for ordering packaged steam generators, this features a large, 2-color cutaway illustration and explanation of design features. Includes full specifications and dimensions as well as test data. Superior Combustion Industries, Inc.

290 Steam Cleaner—Form SUP 100 features a high-speed, high-pressure cleaning unit for heavy-duty cleaning jobs which also operates as a process heat generator. Includes pictures and dimensions of trailer mounted, portable, and stationary models, giving specifications for each; also lists optional equipment. Eighteen features of the unit are discussed separately. Hypresure Jenny Div., Homestead Valve Mfg. Co.

291 Heavy Duty Cleaner — Form A-752 describes and illustrates working principle and advantages of a portable industrial cleaning unit with 3 hp motor and 4 cu ft dust storage capacity. Cutaway illustration shows how unit is built. United States Hoffman Machinery Corp.

MISCELLANEOUS

292 Four Handy Guides for Plant Engineers—Bulletin 20B 6051J, 12 pp, offers data on figuring V-belt drives; Bulletin 51B 6052K, 12 pp, for quick selection of electric motors; Bulletin 32B 6059K, 16 pp, for selection of centrifugal pumps, and Bulletin 25B 6150S, 32 pp, for a description of equipment for power generation, distribution and control. Any or all of these booklets are available—specify those wanted. Allis-Chalmers Mfg. Co.

293 Industrial Rubber Products—This is a comprehensive collection of data covering all types of hose, belting, packing and other rubber products manufactured by company, including work gloves and helmets, linings, and hard rubber items. Fully illustrated, provides descriptions, specifications for all products as well as recommended applications. The B. F. Goodrich Co.

294 Machine Mountings—This folder describes and illustrates use of a vibration isolating and shock absorbing material recommended for use as machine mounting or as component parts. Explains how material functions and how it is installed. Fabreeka Products Co.

295 Steel Work Benches—Form 701 is an ordering guide for work benches, illustrating models and providing explanation of features as well as listing dimensions and specifications and available top materials. Also gives ordering data on drawer tiers, continuous benches, bench tops, parts and accessories. Standard Pressed Steel Co.

296 Metal and Asbestos Gaskets — This 32-pp catalog covers company's stock gaskets of all types as well as gaskets fabricated to specifications. Illustrated with photos it includes full specifications, dimensions, application data. Also contains engineering data helpful in estimating gasketing needed. United States Gasket Co.

297 Chemical Proportioning Literature—Bulletin CAT lists more than 50 available bulletins and reprints of articles published by manufacturer on the general subject of constant rate and flow responsive chemical proportioning. Material listed covers equipment, methods and applications. %Proportioneers, Inc.%

298 Visual Planning Equipment — The importance, application, and cost of three-dimensional planning material is presented in this file of helpful data. Tells reasons why proper planning is basis for manufacturing cost reductions and includes many photos of typical visual layouts. Also quotes prices of visual material and provides instructions for ordering it. "Visual" Planning Equipment Co., Inc.

299 Phone Booths for Noisy Spots—Bulletin 184 provides photos of several of company's floor and wall model phone booths designed to permit telephone conversations in factories, utility plants, commercial buildings. Stresses advantages and versatility of the booths and describes and pictures construction. Burgess-Manning Co.

300 Steam Power Plant Auxiliaries — In Vol. 36, No. 4 of Lubrication, a technical publication on selection and use of lubricants, is an article of recommended lubrication practices for steam power plant auxiliaries. Illustrated with photos and sketches, it discusses automatic coal firing machinery, stoker design, pulverizers, tube cleaners, compressors, motors fans and blowers, external reciprocating elements of pumps and compressors and similar subjects. The Texas Co.

301 Air and Gas Cleaners—Manual 130-E covers new designs and improvements in oil bath air and gas cleaners. Recently added sizes and a new design are introduced. Photos of models, charts, dimension table and detailed engineering data are included. American Air Filter Co., Inc.

302 Underfeed Stokers—Manufacturer's underfeed stokers for loads from 100 to 360 developed hp, and those designed to carry loads up to maximum usually required of a single retort, ram type, side dump underfeed stoker, are presented in Bulletin SB 27. Illustrates, by photos, and explains construction and design details; also includes dimensional data. Discusses stop-start control and full range automatic control. Pictures several installations. Erie City Iron Works.

THE HALLOWELL STEEL POSTURE STOOL

HALLOWELL Stools are constructed of heavy, pressed steel welded for strength, rigidity and long service. Simple, functional design invites the correct, comfortable posture that promotes worker productivity. Appearance is neat and attractive. Light weight, adjustable back rest and round seat appeal to women workers.

Available in a variety of types to meet practically every industrial seating requirement.

Full details contained in Bulletin #704.

SHOP EQUIPMENT HALLOWELL OF STEEL

Work Benches
Foreman's Desks
Tool Stands
Platform Trucks
Posture Stools
Posture Chairs
Cabinets
Folding Tables

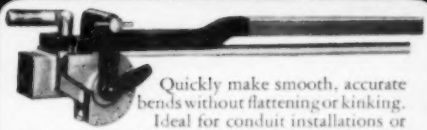
SPS STANDARD PRESSED STEEL CO.
JENKINTOWN 26, PENNSYLVANIA

"LIQUIDS WORTH STORING ARE WORTH MEASURING" WITH A LIQUIDOMETER Tank Gauge

WRITE FOR COMPLETE DETAILS

THE LIQUIDOMETER CORP.
36-31 SKILLMAN AVE., LONG ISLAND CITY 1, N.Y.

GREENLEE HAND BENDERS...for making small-radius bends in pipe, tubing, conduit.



Quickly make smooth, accurate bends without flattening or kinking. Ideal for conduit installations or fitting pipe and tubing on machines . . especially designed to form neat bends for sharp corners and nooks. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid or thin-wall conduit.

Free Folder and Booklet on the Greenlee Bender line. Write Greenlee Tool Co., 1886 Herbert Avenue, Rockford, Illinois.

GREENLEE

For Your Material Handling Needs

Use SPEEDWAYS Low Cost,

Labor-Saving Conveyors

Speedways Wheel Conveyors
Available in 5 and 10 ft. straight lengths. (45° and 90° sections also standard). Easily hooked up without tools. 12"-15"-18" standard widths. 8, 10 or more wheels per foot. Lightweight, sturdily built, portable. For moving packages, cartons, etc.

SpeedTUBE (Roller) Conveyors
Built in 5' and 10' sections. (45° and 90° sections standard). Easily hooked up without tools. 12", 15", 18" standard widths. Roller spacing from 3" to 12". Lightweight, sturdy, portable, for moving irregularly shaped or nonpackaged products.

SpeedLIFT
Portable endless belt conveyor for moving from one level to another. Standard lengths 10', 12', 15'. Elevations from 18" to 130". Standard belt width 14". Capacity 500# in horizontal position, 300# at 30° angle. Electric motor operated.

PermaLIFT
Permanent Floor to Floor Conveyors. Standard Models in lengths from 15' to 43'. To lift from 8' to 20'. Standard Belt Width 14".

KEEP 'EM ROLLING WITH SPEEDWAYS CONVEYORS, INC.

1297 Niagara St.
Buffalo 13, N. Y.

Represented and carried in stock by Materials Handling Engineers in principal cities in U. S., and many foreign countries. Consult telephone directory. Also manufactured in Canada, Union of South Africa.

SAVE TIME... MANY WAYS with-

GOLD MEDAL MIDGET
Safety
Swinging Scaffolds

■ *A midget in size . . . a giant in safety,* GOLD MEDAL Midget Scaffolds are ideal for painting, repair work, tuck-pointing and light construction.

Light—One man can carry a Midget winch and stirrup.

Safe. . . . Steel wire rope assures extra strength; positive 3-way lock prevents slipping or running down.

Easy to install No time lost tying or untying dangerous hitches; uncoiling ropes.

Easy to operate Pinion gear for fast raising — worm gear for smooth lowering.

FREE BULLETIN gives full information. Write for your copy.

A COMPLETE, NATION-WIDE SCAFFOLDING SERVICE

Seventy years experience in designing, making and supplying off-the-ground safety equipment assures you:

WHAT YOU NEED . . . scaffolding for every type of building construction, renovation and maintenance . . . to fit your regular needs or designed to solve your "special" problems.

WHERE YOU NEED IT . . . from 16 branch offices—plus authorized representatives in all major cities.

WHEN YOU NEED IT . . . ample local stocks—*for sale or lease*—assure quick delivery anywhere for all jobs—large or small.

GOLD MEDAL LAUDER SCAFFOLDING

for Greater Safety...Efficiency...Economy

THE PATENT SCAFFOLDING CO., Inc.

38-21 12th St., Dept. PE. Long Island City 1, New York

See Your Classified Telephone Directory for nearest office.

New Books for Plant Engineers

An asterisk (*) following the title of any book described in this department indicates that the book may be purchased from the Book Department, PLANT ENGINEERING, 110 S. Dearborn St., Chicago 3, Ill.

Standard to Measure Dissolved Oxygen in Water

Method of Procedure for the Determination of Dissolved Oxygen in Deaerated and/or Partially Deaerated Waters. Size 8½ by 11 in.; 32 pp; paper bound; first edition. Published by Heat Exchange Institute, 90 West Street, New York 6, N. Y. Price $2.00.

A STANDARD for the measurement of dissolved oxygen in water has been produced by the Direct Contact Heater Section of Heat Exchange Institute. This standard has been selected from the results obtained from a comprehensive investigation of the various test methods and procedures commonly used.

Heat Exchange Institute has, in the course of its investigation, eliminated as far as possible all known sources of error or has provided means for correcting known sources of error in its selection of test equipment and in carefully outlining the test procedure.

This material covers such items as: the apparatus recommended, the method of sample collection, the procedures for fixing and titrating samples, and computation of results.

Know Where the Power Lies*

THEORY AND DESIGN OF GAS TURBINES AND JET ENGINES by E. T. Vincent. Size 6 by 9 in.; 604 pp; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc. Price $7.50.

IN THIS TEXT, an effort has been made to bring the aerodynamic and gas dynamic problems down to a point where the general engineering student without aeronautical background can understand the main problem involved.

The materials are arranged so that the theoretical treatment can be given in one course, such as to a senior mechanical engineering group; and the application to a specific design problem given as a subsequent course to graduate students.

This book is well illustrated with diagrams and photographs of actual gas turbine components and their performance. Problems are given at the end of each chapter, also lists of the reference works and a bibliography are given at the end of the book.

In a pocket on the inside back cover is the well known chart of Thermodynamic Properties of Air reproduced with permission of the Bureau of Ships of the Navy Department.

Sampling and Testing Industrial Water

ASTM Standards of Industrial Water by ASTM Committee D-19. Size 6 by 9 in.; 142 pp; illustrated; paper bound. Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price $1.75.

THIS NEW compilation brings together in convenient form the various ASTM standard methods of sampling, analyzing and testing of industrial water for use of all those interested in this field. These methods have been developed particularly

(Continued on page 106)

Way out in front because it's better 4 ways

IMPERIAL Hi-Duty® TUBE CUTTER

The favorite with men who cut tubing. Free Wheeling Ball Bearing Action makes tube cutting faster, better, easier. Makes clean, right angle cut on hard or soft tubing. Has broad range, ⅛" to 1" O.D. Extremely compact, only 4½" long. High strength aluminum alloy body. Imperial quality throughout. Ask for Folder 347.

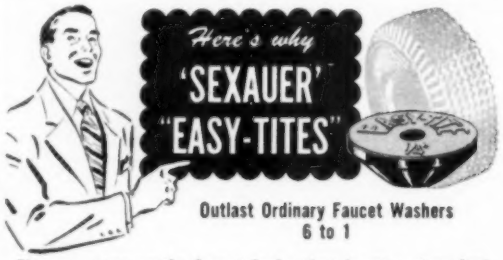
No. 274-F Hi-Duty Tube Cutter for ⅛" to 1" O.D. Tubing.

The Imperial line of tubing tools is the complete line—a tool for every job. No. 364-F tube bender (above) and No. 193-F flaring tool (below) are illustrated.

See Your Supply House

THE IMPERIAL BRASS MFG. CO., 522 S. Racine St., Chicago 7, Ill.

IMPERIAL



Outlast Ordinary Faucet Washers 6 to 1

You can stop costly faucet leaks that boost water, fuel and labor costs and ruin expensive fixtures. Insist on pat'd "EASY-TITE" Faucet Washers—made of DUPONT NEOPRENE to withstand absorption and extreme high temperatures (upwards of 300° F). Fabric reinforced like a tire, "EASY-TITES" can't split or mush out of shape. Outlasting ordinary washers 6-to-1, "EASY-TITES" have cut faucet repairs to a minimum and brought maintenance costs sharply down in plants, hospitals, schools, hotels and institutions everywhere.

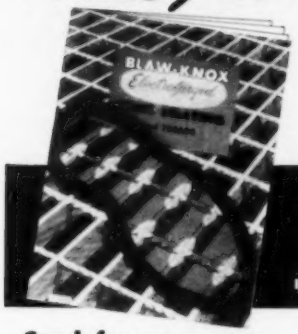
FREE! VALUABLE 112-PAGE CATALOG

Lists over 2,300 'SEXAUER' Triple Wear Replacement Parts and pat'd Precision Tools as advertised in the SATURDAY EVENING POST. Standard with leading maintenance engineers everywhere. Send a postcard for your free copy TODAY.

J. A. SEXAUER MFG. CO., INC.
2503-05 Third Ave., Dept. S-60 New York 51, N. Y.

SEXAUER
World's leading specialists in plumbing and heating maintenance.

Here's your Catalog for grating and stair treads

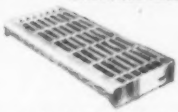


Full of applications, specifications and engineering data that will help solve your grating problems

Send for your copy TODAY WHATEVER your grating problem . . . flooring, catwalks, stair treads, bridge surfacing, sidewalk doors, subway gratings, or any of the hundred and one uses for any industry . . . you'll want this big new Bulletin for complete information on construction details and *all* the advantages of Blaw-Knox Steel Gratings. Ask for Bulletin 2296.

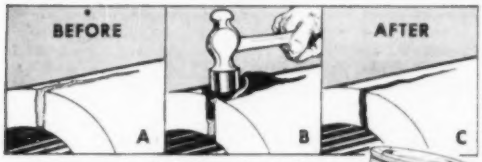
BLAW-KNOX DIVISION
of Blaw-Knox Company
2106 Farmers Bank Bldg., Pittsburgh 22, Pa.

BLAW-KNOX ELECTROFORGED STEEL STAIR TREADS



Designed for tremendous strength against impact. Available with rolled diamond checker plate nosing (illustrated); twisted crossbar nosing; or abrasive nosing.

BLAW-KNOX ELECTROFORGED STEEL **GRATING**



A – Deep crack. B – Tamping Smooth-On in. C – Crack completely sealed.

If You've Never Used SMOOTH-ON, *read this:*

Smooth-On No. 1 Iron Cement is a metallic powder which you mix with water to the consistency of putty. You tamp it, while still soft, into a crack or hole, making sure to force it against all surfaces. With Smooth-On you don't need to use heat or special gadgets. As it hardens, it expands slightly, clinging tightly in place. The repaired part is ready for use as soon as Smooth-On sets hard. Keep Smooth-On handy for both emergency and routine maintenance repairs. Buy it in 7 oz., 1 lb., 20 lb., or 100 lb. If your supply house hasn't Smooth-On No. 1, write us.

FREE 40-PAGE REPAIR HANDBOOK

Shows many industrial and home repairs made with No. 1 and other Smooth-On Cements. Leaks stopped, cracks sealed, loose parts made tight. 170 illustrations. Drop us a line for YOUR free copy.

SMOOTH-ON MFG. CO., Dept. 85
570 Communipaw Ave., Jersey City 4, N. J.

50-293

Do it with **SMOOTH-ON**
THE IRON CEMENT OF 1000 USES

Only LO-HED hoists give ALL these advantages!

TODAY'S BEST BUY is Lo-Hed Electric Hoists. You pay no more for Lo-Heds than ordinary hoists. Lo-Hed is the only "balanced design" hoist that affords longer working life at least cost. With no working parts under the "I" beam or track, they lift loads higher. They've a transformer that protects operators . . . a shrouded bottom block for added safety . . . a hook hung on a revolving bearing . . . tougher, more reliable electrical cables.

Lo-Hed Hoists come in five suspension types and a range of capacities. Units can be engineered for your particular needs. Mail coupon for full data.

LO-HED MEANS LOW OVERHEAD

AMERICAN ENGINEERING
COMPANY
PHILADELPHIA 25, PA.

Other AE Products are Taylor and Perfect Spread Stokers, Marine Deck Auxiliaries, Hele-Shaw Fluid Power, Lo-Hed Car Shakers, Lo-Hed Car Pullers

American Engineering Company
2503 Aramingo Ave., Philadelphia 25, Pa.
Gentlemen: Send me full information about LO-HED Electric Hoists.

Name _____
Company _____
Address _____
City _____ State _____

ADVERTISER'S INDEX

Allis-Chalmers Mfg. Co. ..... Back Cover
Agency—Compton Advertising Agency

Aluminum Company of America ..... *
Agency—Fuller & Smith & Ross, Inc.

American Air Filter Company, Inc. ..... *
Agency—The Griswold-Eshleman Co.

American Brass Company, The 13, 73
Agency—Kenyon & Eckhardt Inc.

American District Steam Co. ..... *
Agency—Squier and Davis, Inc.

American Engineering Co. 103
Agency—Beatty and Oliver, Inc.

American Monorail Co., The 8
Agency—The Bayless-Kerr Company

Anderson Co., The V. D. ..... *
Agency—Will, Inc.

Annin Co., The 96
Agency—The McCarty Co.

Anti-Corrosive Metal Products Co., Inc. ..... *
Agency—Woodard & Fris, Inc.

Armstrong Machine Works 5
Agency—Russell T. Gray, Inc.

Arrow-Hart & Hegeman Electric Company, The ..... *
Agency—Hugh H. Graham & Associates, Inc.

Atlas Valve Co. ..... *
Agency—W. F. Schaphorst

Beaver Pipe Tools, Inc. 98
Agency—Meek and Thomas, Inc.

Benjamin Electric Mfg. Co. ..... *
Agency—Van Auken, Ragland & Stevens

Binks Manufacturing Company ..... *
Agency—Homer J. Buckley & Associates

Black, Sivalls & Bryson, Inc. 14-15
Agency—The Potts-Turnbull Company

Blaw-Knox Company 103
Agency—Russell T. Gray, Inc.

Blue Ridge Glass Corp. ..... *
Agency—Fuller & Smith & Ross, Inc.

Bonney Forge & Tool Works ..... *
Agency—Seberhagen, Incorporated

Breuer Electric Mfg. Co. ..... *
Agency—Gebhart & Brockson, Inc.

Burgess-Manning Co. 106
Agency—The Fensholt Co.

Cash Company, A. W. ..... *

Central States Distributors, Inc. ..... *
Agency—Admakers

Clarage Fan Company 24
Agency—William J. Williams

Cleveland Crane & Engineering Co., The ..... Inside Back Cover

Cochrane Corporation ..... *
Agency—Willard G. Myers Advertising Agency

Cook's Sons, Inc., Adam ..... *

Crane Co. 29
Agency—The Buchen Company

Dampney Company of America, The ..... *

Darling Valve & Manufacturing Co. 67
Agency—The Griswold-Eshleman Co.

Dart Mfg. Co., E. M. ..... *
Agency—Sutherland-Abbott

De Laval Steam Turbine Co. 75
Agency—Geo. H. Gibson Co.

Deming Co., The 70
Agency—G. M. Basford Co.

Dempster Brothers 23
Agency—Charles S. Kane Co.

Detroit Steel Products Company ..... *
Agency—Fuller & Smith & Ross, Inc.

Diamond Chain Company, Inc. ..... *
Agency—Kirkgasser-Drew

Dings Magnetic Separator Company 82
Agency—Russell T. Gray, Inc.

Dollinger Corporation ..... *
Agency—Cosler, Hempstead & Hanford, Inc.

Dravo Corporation 76
Agency—Ketchum MacLeod & Grove, Inc.

Economy Engineering Company ..... *
Agency—Kreicker & Meloan, Inc.

Edmont Mfg. Co. ..... *
Agency—Mumm, Mullay & Nichols, Inc.

Elliott Company 99
Agency—Horton-Noyes Co.

Erie City Iron Works 25
Agency—Davies & McKinney

Ericz Manufacturing Company 95
Agency—John Mather Lupton Company

Everlasting Valve Co. 88
Agency—Michel-Cather, Inc.

Fabreeka Products Company, Inc. 96
Agency—Edmund S. Whitten, Inc.

Feedrail Corporation ..... *
Agency—W. L. Towne Advertising

Ferranti Electric, Inc. 98
Agency—Rose-Martin, Inc.

Flexrock Company ..... *
Agency—Walter S. Chittick Company

Flintkote Company, The 78
Agency—Marchalk & Pratt Co.

Frick-Gallagher Mfg. Co., The 68
Agency—John P. Eldridge

Fuller Brush Co. ..... *
Agency—John B. Fairbairn

Fuller Company 95
Agency—O. S. Tyson and Company, Inc.

Garlock Packing Co., The 16, 32
Agency—Hutchins Adv. Co., Inc.

General Electric Company ..... *
Agency—G. M. Basford Co.

General Electric Company, Construction Materials Dep't. 79
Agency—G. M. Basford Co.

Golden-Anderson Valve Specialty Co. 3
Agency—Walker & Downing

Goodrich Co., The B. F. 64
Agency—The Griswold-Eshleman Co.

Goulds Pumps, Inc. 2
Agency—Charles L. Rumrill & Co., Inc.

Great Lakes Steel Corporation 101
Agency—Campbell-Ewald Company

Greenlee Tool Co. ..... *
Agency—Howard H. Monk and Associates

Grinnell Company, Inc. 69
Agency—Horton-Noyes Co.

Gulf Oil Corporation ..... *
Agency—Young & Rubicam, Inc.

Hall Laboratories 17
Agency—Ketchum, MacLeod & Grove, Inc.

Harnischfeger Corporation 63
Agency—The Buchen Company

Hartzell Propeller Fan Co. ..... *
Agency—The Kight Advertising Co.

Hillyard Chemical Company 21
Agency—Phillips-Reich-Fardon

Homestead Valve Manufacturing Co. 59
Agency—Smith, Taylor & Jenkins Inc.

Horn Co., Inc., A. C. 102
Agency—J. D. Tarcher & Co., Inc.

Imperial Brass Mfg. Co. 31, 71
Agency—Kreicker & Meloan, Inc.

International Nickel Co., Inc., The 28
Agency—Marchalk & Pratt Co.

Jefferson Electric Co. ..... *
Agency—Kirkgasser-Drew

Jeffrey Mfg. Co., The 85
Agency—Ryer & Bowman Adv. Agency

Jenkins Bros. ..... *
Agency—Horton-Noyes Co.

Joy Mfg. Co. ..... *
Agency—Walker & Downing

Kennedy Valve Mfg. Co. *
Agency—Charles L. Rumrill & Co., Inc.
Kirk & Blum Mfg. Co., The *
Agency—The S. C. Baer Company
Knopf Instrument Company 92
Koiled Kords *
Agency—Hugh H. Graham & Associates, Inc.
Koppers Co., Inc. 81
Agency—Vansant, Dugdale & Company, Inc.
Koppers Co., Inc., Tar Products Division *
Agency—Batton, Barton, Dustine & Osborn, Inc.
Korfund Company, Inc., The *
Agency—Sanger-Funnell, Inc.
Legge Co., Inc., Walter G. *
Agency—Royer & Roger, Inc.
Lewis-Shepard Products, Inc. *
Agency—Edmund S. Whitten, Inc.
Lift Trucks Incorporated 97
Agency—The S. C. Baer Company
Liquidometer Corp., The 100
Agency—Lucerna Co., Inc.
Maguire Co., Inc., Walter 84
Agency—O. S. Tyson and Company, Inc.
Mercoid Corporation, The *
Metallizing Engineering Co., The *
Agency—The Schuyler Hopper Co.
Micro Switch 35
Agency—Hamilton Advertising Agency
Mortell Co., J. W. 99
Agency—Weston-Barnett, Inc.
Niagara Blower Company 66
Agency—The Moss-Chase Co.
Nicholson & Co., W. H. 92
Agency—Wilbur A. Myers
Paasche Airbrush Co. *
Agency—Merchandising Advertisers, Inc.
Pangborn Corp. 84
Agency—Vansant, Dugdale & Company
Patent Scaffolding Co., Inc., The 101
Agency—Glenn, Jordon, Stoetzel, Inc.
Powers Regulator Co., The *
Agency—Symonds, Mackenzie & Co.
Pritchard & Co., J. F. 106
Agency—Carter Advertising Agency, Inc.
% Proportioneers, Inc. % *
Agency—Hammond-Goff Co.
Remington Rand, Inc. 83
Agency—Leeford Advertising Agency, Inc.
Republic Rubber Division *
Agency—Meek & Thomas, Inc.
Richards-Wilcox Mfg. Co. *
Agency—George H. Hartman Company
Robbins & Myers, Inc. 9
Agency—Erwin, Wasey & Co., Ltd.
Robbins & Myers, Inc. 26, 99
Agency—Byer & Bowman Adv. Agency
Robertson Co., H. H. 87
Agency—Fuller & Smith & Ross, Inc.
Rohm & Haas Company *
Agency—John Falkner Arndt & Company, Inc.
Rotary Concrete Drill Co. *
Agency—Neale Advertising Associates
Rowe Methods, Inc. *
Agency—Stedfeld & Byrne, Inc.
Ruemelin Mfg. Co. *
Agency—Paulson-Gerlach & Associates, Inc.
Safway Steel Products, Incorporated *
Agency—The Cramer-Krasselt Co.
Sarco Company, Inc. 91
Agency—W. L. Towne Advertising
Sexauer Mfg. Co., Inc., J. A. 102
Agency—Reiss Advertising
Shell Oil Company 65
Agency—J. Walter Thompson Company
Shepard Niles Crane & Hoist Corporation 62
Agency—Baker, Jones, Hausauer, Inc.
Simplex Valve and Meter Company *
Agency—Cunningham & Walsh, Inc.
Skinner Co., M. B. 94
Agency—Jones & Taylor and Associates
Sly Mfg. Co., The W. W. *
Agency—The Bayless-Kerr Co.
Smooth-On Mfg. Co. 103
Agency—Michel-Cather, Inc.
Snap-On Tools Corporation 22
Agency—Scott, Inc.
Sonneborn, Inc., L. 80
Agency—Hicks & Greist, Inc.
Speedway Conveyors, Inc. 101
Agency—Charles L. Rumrill & Co., Inc.
Speer Carbon Company 94
Agency—O. S. Tyson & Company, Inc.
Spencer Turbine Co., The 34
Agency—W. L. Towne Advertising
Stalwart Rubber Company *
Agency—Penn and Hamaker, Inc.
Standard Pressed Steel Co. 100
Agency—R. E. Lovekin Corp.
Standard Stoker Company, Inc., The 72
Agency—Davies & McKinney
Stickle Steam Specialties Company *
Agency—Caldwell, Larkin & Company, Inc.
Stemco Corporation 33
Agency—Fuller & Smith & Ross, Inc.
Superior Combustion Industries, Inc. 61
Agency—Charles H. Davis
Superior Electric Company, The *
Agency—Hugh H. Graham & Associates, Inc.
Swartwout Co., The 74
Agency—Carr Liggett Advertising, Inc.
Templeton, Kenly & Co. *
Agency—Glenn, Jordan, Stoetzel, Inc.
Texas Company, The *
Agency—Erwin, Wasey & Co.
Tide Water Associated Oil Company 77
Agency—G. M. Basford Company
Trimont Mfg. Co. 27
Agency—Horton-Noyes Company
Troy Engine & Machine Company *
Agency—Sanger-Funnell, Inc.
Trumbull Electric Mfg. Co. 18
Agency—James Thomas Chirurg Co.
United States Gasket Co. 78
Agency—McLain-Dorville, Inc.
Up-Right Scaffolds *
Agency—Norton M. Jacobs Advertising Agency
U. S. Hoffman Machinery Corporation 80
Valvair Corporation *
Agency—C. A. Reece
Visual Planning Equipment Co., Inc. *
Wagner Electric Corporation 11
Agency—Arthur R. Mogge, Incorporated
Warren Refining & Chemical Co. 86
Agency—John Yezbak & Company
Westinghouse Electric Corporation 6-7
Agency—Fuller & Smith & Ross, Inc.
Westinghouse Electric Corporation Elevator Div. *
Agency—Fuller & Smith & Ross, Inc.
Whitney Chain Company *
Agency—Sutherland-Abbott
Wickwire Spencer Steel Div. of C F & I *
Agency—Doyle, Kitchen & McCormick, Inc.
Wiegand Company, Edwin L. *
Agency—Smith, Taylor & Jenkins, Inc.
Wiley & Sons, Inc., John 93
Agency—The Waterston Company
Williams Gauge Co., The 86
Agency—Walker & Downing
Winkelman Co., The *
Worthington Pump & Machy. Corp. *
Agency—James Thomas Chirurg Co.
Yarnall-Waring Company 36
Agency—Walter S. Chittick Company

Firms whose advertising is not in this issue but is appearing in other issues are marked with an *

(Continued from page 102)

for the examination of water employed industrially in the generation of steam or for process or cooling purposes and for the examination of deposits formed from such waters.

The publication includes 26 methods which cover sampling, analysis, corrosivity tests, reporting and general testing methods. A list of ASTM symposiums and technical papers on industrial waters is also included.

Have You a Materials Handling Problem?

INDUSTRIAL MATERIALS HANDLING compiled by Curtis H. Barker, Jr., revised and rewritten by I. M. Footlik, C. F. Yarham and J. Francis Carle. Size $5\frac{1}{4}$ by $8\frac{1}{4}$ in.; 381 pp including bibliography and index; first edition; cloth bound. Published by Lincoln Extension Institute, Inc., 1401 W. 75th St., Cleveland 2, Ohio. Price $4.75.

THIS EDITION was designed to fill a long felt need shown by industrial personnel, colleges, universities, technical institutes, and professional societies for a comprehensive treatment of materials handling in industry. Its prime objective is to establish a basic philosophy for thinking and acting objectively in effecting savings of money, time and effort in the industrial handling processes by the application of the new analyses, equipment and procedures to existing needs.

This new book has been "trial-taught" in college level classes. It provides a training medium and reference for all industrial personnel, plant engineers, plant and works managers, superintendents, supervisors, traffic managers, warehousemen, top level industrial executives and college students. It serves as a materials handling handbook for plant engineers. It also serves as an excellent training tool for the industrial training director and for the college instructor.

Some of the major features cover such items as: a basic equipment outline with emphasis on all types of equipment and their application and uses; over 100 practical illustrations of equipment, procedures and applications; a tested system of "handligs"—newly devised symbols used to represent handling equipment, motions and men on Flow Process Charts and plant layout; the "how" of making a handling cost analysis; and many more interesting features.

This book should prove helpful to all plant engineers and especially to those plant engineers who are continually confronted with materials handling problems.

Steel Casting from Beginning to Now

A HISTORY OF STEEL CASTING, prepared under the direction of William H. Worrilow and edited by Arthur D. Graeff. Size 6 by 9 in.; 168 pp; cloth bound. Published under auspices of Steel Founders' Society of America, District No. 1. Copies available from William H. Worrilow, President, Lebanon Steel Foundry, Lebanon, Pa. Price $2.50.

IMPORTANCE OF the steel casting industry as a significant contributor to industrial progress and economic welfare of the nation through the last century is emphasized in this new book.

Prepared under the direction of William H. Worrilow and other industry leaders in the East, the volume includes a general history of the ferrous foundry industry, and reports on the origin of steel castings in Germany, Switzerland, England and the United States.

Of particular interest is a detailed primer of steel casting production covering original methods and vast advances subsequently effected in furnace practice, process, molding, pouring, pattern making, cleaning and finishing, testing and inspecting, and the wide variety of steel castings now available to supply the needs of other basic industries.

Tributes are paid to the leadership of pioneer foundrymen, and detailed treatment is given to individual histories of steel casting companies in the district, which incorporates all New England states, New Jersey, Delaware, Maryland, Eastern sections of New York, Pennsylvania and Virginia, and the Province of Quebec.

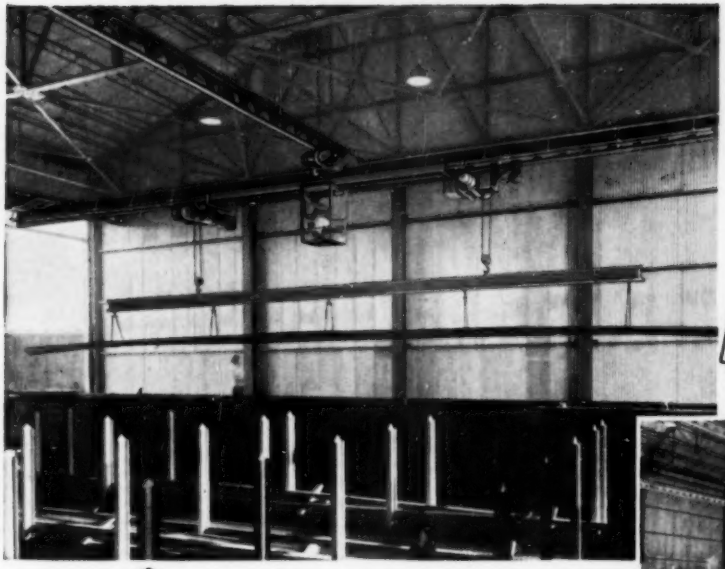
YES... YOU CAN
HEAR IN NOISY SPOTS
USE Burgess-Manning ACOUSTI-BOOTHS
You can hear easily . . . talk comfortably . . . in a Burgess-Manning Acousti-Booth. Thick walls of sound-absorbent material soak up noise. Conversations are clearer . . . "private." Airy, no door . . . easily moved . . . sturdy construction.
HYDRAULIC PRESSROOM
METAL CLEANING ROOM
ELECTRIC SUBSTATION

Mail Coupon for FREE BULLETIN

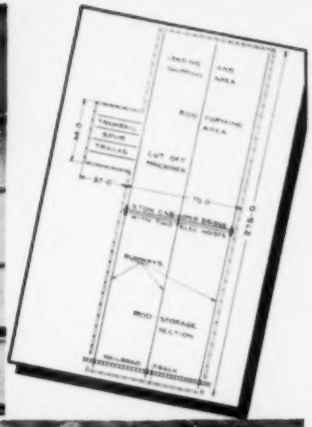
BURGESS-MANNING COMPANY
743-I East Park Avenue, Libertyville, Illinois
Please send booklet describing Burgess-Manning Acousti-Booths.

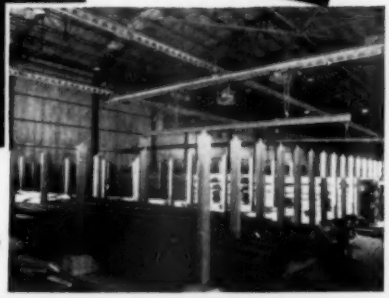
Name _____
Firm Name _____
Street-City _____

COOLING TOWERS
GAS EQUIPMENT
AIR COOLED HEAT EXCHANGERS
Producers of QUALITY Specialized Process EQUIPMENT
Pritchard's
NEW
Quintair*
Air Cooled Heat Exchanger
For Dependable, Efficient Cooling or Condensing of Liquids, Gases or Vapors.
• Lower Installed Cost
• Fewer Parts to Assemble
• Lower Maintenance Costs
• Lower Operating Costs
• Higher Efficiency
• Many Industrial Uses
Write for FREE Bulletin No. 11.0.080
* Registered Trade Name
EQUIPMENT DIVISION
J.F. Pritchard & Co.
Dept. No. 19 908 Grand Ave., Kansas City 6, Mo.
District Offices: Chicago • Houston
New York • Pittsburgh • Tulsa • St. Louis
Representatives in Principal Cities



Handling bundles of reinforcing rod 65'0" long from gondola car to storage with cab-operated 5 ton Cleveland Tramrail bridge.





The rod is quickly and easily handled by the overhead bridge in and out of this efficient storage area designed by Southern States Steel Corporation engineers.

UNLOADS RAILROAD CARS IN 5% TIME FORMERLY REQUIRED

CONCRETE reinforcing rods are handled out of railroad cars at the modern plant of the Southern States Steel Corporation, Dallas, Texas, to storage by a Cleveland Tramrail cab-operated transfer bridge in one-twentieth of the time required by hand methods. Thus only three man-hours are now required to unload a car, whereas it formerly took 64 to 96 man-hours to do the job.

Not only is time saved in unloading the incoming rod, but equally large time savings are made in delivering rod from storage to cut-off machines and in loading shaped rods onto outgoing trucks.

The bridge which travels on a 3-track runway is completely motorized, cab-operated and of 5 tons capacity. It interlocks with 4 spur tracks at the cut-off machines where bundles of rod are lowered onto roller conveyors serving the machines.

The two hoists have a lift of 24 feet and are located on the bridge with the cab between. Rod up to 65'-0" long is handled by use of a lifting beam.

GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7544 East 284th Street WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

A GROUNDED 200 hp motor recently put a large press out of commission for a midwest steel-tank firm. Dietz Electric, A-C Certified Service Shop, picked up the motor Saturday a.m. The stator was rewound and the motor back on the press in 36 hours — with no lost production time!

GET, FAST, RELIABLE SERVICE like this wherever your plant is located from your nearest A-C Certified Service Shop. There are 80 of these shops in every major industrial area in the U. S.

These independent shops are hand-picked for fine workmanship, high business standards, and excellent facilities. Their work meets factory-established standards.

When you need new motors — or matching control — call your nearest A-C Certified Service Shop or Authorized Dealer. A-3067

ALLIS-CHALMERS, 963A SO. 70 ST.
MILWAUKEE, WIS.

ALABAMA
Birmingham—Elect. Repair & Serv. Co.
Montgomery—Standard Electric Co.

ARIZONA
Bisbee—Copper Electric Co., Inc.

CALIFORNIA
San Diego—Calif. Elect. Works
Los Angeles—Larsen-Hogue Elec. Wks.
Oakland—T. L. Rosenberg Company
San Francisco—Weidenthal-Gesdiner
San Jose—Rosendin Elec. Works

COLORADO
Denver—Baker Electric Company

CONNECTICUT
Hartford—Charles H. Leppert
Waterbury—Elec. Motor Repair Co.

FLORIDA
Jacksonville—Turner Elec. Works
Miami—Penninsular Armature Wks.
Tampa—Tampa Armature Works

GEORGIA
Atlanta—Bearden-Thompson Elec. Co.
Columbus—Smith-Gray Electric Co.

ILLINOIS
Chicago—Chicago Electric Company
Marion—Giles Armature & Elec. Wks.

INDIANA
Indianapolis—Scherer Electric Co.
Evansville—Evansville Elec. & Mfg. Co.

IOWA
Sioux City—Smith Elec. & Supply Co.

KANSAS
Wichita—Tarrant Elec. Machinery Co.

LOUISIANA
New Orleans—Industrial Electric
Shreveport—Shreveport Arm. & Elec.

MAINE
Brewer—Stanley J. Leen Company

MARYLAND
Baltimore—Keystone Elec. Co., Inc.

MASSACHUSETTS
Concord—A. S. Tracy
Roslindale—Ranney Electric Motors
Springfield—Elec. Motor Repair Co.

MICHIGAN
Grand Rapids—Grand Rapids Ind. Co.
Detroit—Stecker Electric Company

MINNESOTA
Duluth—Mielke Electric Works, Inc.
Minneapolis—Parsons Electric Co.

MISSISSIPPI
Vicksburg—Ludke Electric Company

MISSOURI
Kansas City—Boese-Hilburn Elec. Co.
St. Louis—French-Gerleman Elec. Co.

NEBRASKA
Omaha—Omaha Electrical Works

NEW JERSEY
Atlantic City—Charles A. Buckley
Paterson—Elec. Service Repair Co.
Trenton—Lockwood Elec. Motor Serv.

NEW MEXICO
Albuquerque—Powell Electric Co.

NEW YORK
Buffalo—Robertson Electric Co., Inc.
Jamestown—A. E. Westburgh
New York—Consolidated Elec. Motor
Rochester—Vanderlinde Elec. Corp.
Utica—Mather Evans & Diehl Co.
Watertown—Watertown Electrics, Inc.

NORTH CAROLINA
Charlotte—Southern Elec. Serv. Co.
Rocky Mount—Hammond Electric Co.

OHIO
Cincinnati—Cincinnati Elec. Equip.
Cincinnati—Electric Service Co.

80 ALLIS-CHALMERS

Cuyahoga Falls—A-C Supply Company
Youngstown—Winkle Electric Company

OKLAHOMA
Oklahoma City—Southwest Elec. Co.
Tulsa—Smith-Milligan Electric Co.

OREGON
Eugene—Kalen Elec. & Mach. Co.
Klamath Falls—Ray Bigger Elec.
Portland—Milwaukee Machinery Co.

PENNSYLVANIA
Johnstown—Universal Elec. Mfg. Co.
Osceola Mills—Mid-State Elec. Equip.
Philadelphia—Elec. App. Repair Co.
Pittsburgh—Penn. Elec. Coil Corp.
York—Industrial Electric Company

RHODE ISLAND
Woonsocket—Dauray & Bardsley, Inc.

SOUTH DAKOTA
Sioux Falls—Elec. Motor Repair

TENNESSEE
LaFollette—Standard Armature Wks.
Memphis—Ind. Elec. & Supply Co.

TEXAS
Amarillo—G. E. Jones Electric Co.
Dallas—Industrial Elec. Equip. Co.
El Paso—B & M Machinery Company
Ft. Worth—Central Electric Company
Houston—Roy A. Berents Company

VIRGINIA
Richmond—Wingfield & Hundley
Roanoke—Virginia Armature Company

WASHINGTON
Spokane—Lee F. Austin Company

WEST VIRGINIA
Charleston—Charleston Elec. Supply

WISCONSIN
Green Bay—Beemster Electric Co.
Milwaukee—Dietz Electric Company
Wausau—Electric Motor Service
Wis. Rapids—Staub's Elec. Shop